



GREEN BUILDINGS RETURN ON INVESTMENT: LIGHT INDUSTRIAL



Creating Markets, Creating Opportunities

TABLE OF CONTENTS

Regional summaries	Pages 3 – 8
East Asia	Pages 9 – 16
South Asia	Pages 17 – 21
Africa	Pages 22 – 28
Latin America	Pages 29 – 35
Middle East and North Africa (MENA)	Pages 36 – 40
Eastern Europe	Pages 41 – 47
Methodology, Notes, Acknowledgements	Pages 48 – 53



LIGHT INDUSTRY IN EAST ASIA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Cambodia	\$59,000	\$3,800	1.3
China	93,700 ¥	31,200 ¥	0.3
Fiji	\$1,000	\$200	0.5
Indonesia	727,000 Thousand Rp \$48,000	60,000 Thousand Rp \$4,000	1
Philippines	2,646,000 PhP \$30,000	525,000 PhP \$9,700	0.4
Thailand	\$18,000	\$1,500	1
Vietnam	430 M VND \$18,000	72 M VND \$3,000	0.5



ENERGY

The most cost effective measures include:

- Reduced Window To Wall Ratio
- Energy-Saving Light Bulbs
- Sensible Heat Recovery from Exhaust Air
- Variable Frequency Drives in Air Handling Units
- CO2 Sensors/Demand-Controlled Ventilation for Fresh Air Intake



WATER

The following green interventions yield the best results:

- Water-Efficient Kitchen Faucets
- Aerators & Auto Shut-off Faucets in all Bathrooms
- Rainwater Harvesting Systems



MATERIALS

- Floor slabs are biggest drivers for efficiency improvements, ranging from 35% - 40% of material options

LIGHT INDUSTRY IN SOUTH ASIA



ROI ON MEASURES NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Bangladesh	\$5,660	\$1,820	0.3
India (Delhi)	Rs9,058,465 \$122,000	Rs513,650 \$7,000	1.5
India (Mumbai)	Rs8,883,220 \$120,000	Rs435,735 \$5,800	1.7
Sri Lanka	\$22,470	\$2,185	1



ENERGY

Effective measures include:

- Reduced Window to Wall Ratio
- Reflective Paint/Tiles for Roof
- Skylight to provide daylight to 50% of top floor area
- Solar Photovoltaic for power requirement
- Variable Refrigerant Flow Cooling System



WATER

The EDGE standard can be reached through:

- Dual faucets for all bathrooms
- Auto Shut-off faucets
- Rainwater Harvesting System



MATERIALS

Potential strategies include:

- In-Situ concrete > 30% PFA
- Autoclaved Aerated Concrete Blocks for external and internal walls
- Ceramic Tiles for floor

LIGHT INDUSTRY IN AFRICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Angola	\$182,630	\$10,535	1.4
Cote D'Ivoire	\$58,620	\$2,220	2.2
Ghana	\$173,580	\$14,870	1
Kenya	\$38,100	\$3,810	0.8
Nigeria	\$24,430	\$2,260	0.9
South Africa	ZAR 658,940 \$45,800	ZAR 46,540 \$3,200	1.2



Image sourced from: <https://www.edgebuildings.com/projects/song-hau-surface-water-plant-phase-one/>



ENERGY

The most cost effective measures include:

- Skylights
- Variable Frequency Drives in AHUs
- Solar Hot Water Collectors
- Solar Photovoltaics (depends on country profile)



WATER

The best ROI is from the following interventions:

- Dual Flush for Water Closets
- Water-Efficient Kitchen Faucets
- Aerators and Auto Shut-Off Faucets
- Gray Water Treatment and Recycling System (depends on availability in country)



MATERIALS

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

LIGHT INDUSTRY IN LATIN AMERICA



ROI ON MEASURES NEEDED TO REACH THE EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Argentina	\$70,440	\$2,470	2.4
Brazil	\$350,470	\$5,730	5.1
Colombia	\$78,340	\$2,320	2.8
Costa Rica	254,433,000 CRC \$444,000	7,000,000 CRC \$12,000	3
Mexico	\$117,490	\$6,170	1.6
Peru	1,414,000 S \$42,8000	43,250 S \$13,000	2.5



Image sourced from: https://www.joc.com/international-logistics/industrial-real-estate/us-warehouse-availability-tightens-further_20170712.html



ENERGY

The most cost effective interventions include:

- Natural Ventilation
- Energy Efficient Light Bulbs
- Insulation of Roof and External Wall
- Variable Frequency Driver Cooling Unit

In many countries, Solar Photovoltaics offer a very attractive pay back period.



WATER

The best ROI can be achieved through the following:

- Aerators & Auto Shut-off Faucets in all Bathrooms
- Water-Efficient Urinals
- Dual Flush Water Closet
- Low Flow Faucets



MATERIALS

- Roof Slab or Floor Slabs offer the best potential for efficiency interventions.



PAYBACK PERIOD NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Egypt	\$200,000	2,500	6.5
Jordan	\$190,000	\$26,500	1
Morocco	\$200,000	\$5,700	3
Pakistan	\$42,500	1,400	2.5

Warehouse Example



Image sourced from: https://www.joc.com/international-logistics/industrial-real-estate/us-warehouse-availability-tightens-further_20170712.html



ENERGY

Potential strategies may include:

- Energy Saving Light Bulbs
- Variable Frequency Drives in AHUs
- Solar Hot Water Collectors
- Solar Photovoltaics



WATER

Best green measures include:

- Dual Flush for Water Closets
- Single Flush/Flush Valve
- Water-Efficient Urinals in all Bathrooms



MATERIALS

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

LIGHT INDUSTRY IN EASTERN EUROPE



PAYBACK PERIOD NEEDED TO REACH EDGE STANDARD

	Incremental Cost	Utility Savings / month	Payback Period in Years
Armenia	\$277,040	\$4,420	5.2
Poland	\$86,850	\$9,080	0.8
Russian Federation	\$136,650	\$3,970	2.8
Serbia	\$94,800	\$25,400	0.3
Ukraine	\$151,000	\$1,360	9.2
Turkey	\$137,060	\$5,080	2.2



ENERGY

The most effective interventions include:

- Reduced Window To Wall Ratio
- Skylight to provide Daylight
- Sensible Heat Recovery from Exhaust Air
- Variable Frequency Drives in Air Handling Units
- Variable Refrigerant Flow Cooling System
- Solar Hot Water Collectors



WATER

The EDGE standard can be reached through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



MATERIALS

- Floor slabs are biggest efficiency drivers, ranging from 35% - 40% of material costs out of 6 total interventions
- Using materials other than the base case usually saves over 20%



GREEN BUILDINGS RETURN ON INVESTMENT: LIGHT INDUSTRY IN EAST ASIA



Creating Markets, Creating Opportunities

LIGHT INDUSTRY– CAMBODIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 21% Savings through:

- Variable Frequency Driver in Air Handling Units
- Air Conditioning with Air Cooled Screw Chiller
- Solar Hot Water Collectors



Water – 54% Savings through:

- Dual Flush, Water-Efficient Urinals
- Auto Shut-off, Efficient Faucets
- Rainwater Harvesting System



Materials – 27% Savings through:

- Re-Use of Existing Floorslab

PROJECTED PROJECT METRICS

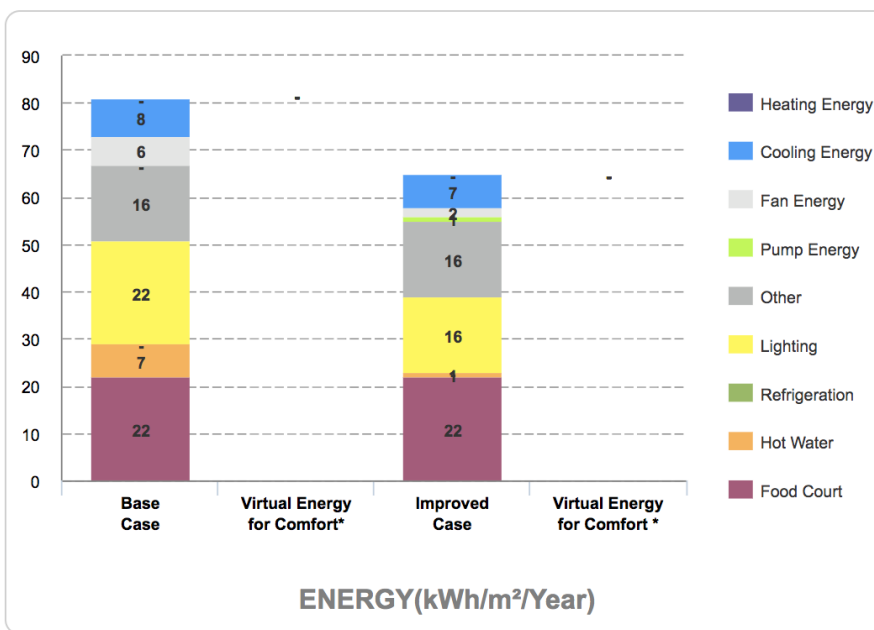
Incremental Cost
\$59,000

Utility Cost Savings
\$3,800 / month

Payback in Years
1.3

Operational CO₂ Savings
195 tCO₂/Year

20.89% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– CHINA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 27% Savings through:

- Variable Refrigerant Flow Cooling System
- Variable Frequency in Air Handling Systems
- Sensible Heat Recovery, Solar Hot Water Heaters



Water – 28% Savings through:

- Water-Efficient Urinals and Faucets
- Rainwater Harvesting and Gray Water Treatment



Materials – 26% Savings through:

- Re-use of Existing Floorslab

PROJECTED PROJECT METRICS

Incremental Cost

93,700 ¥

Utility Cost Savings

31,200 ¥ / month

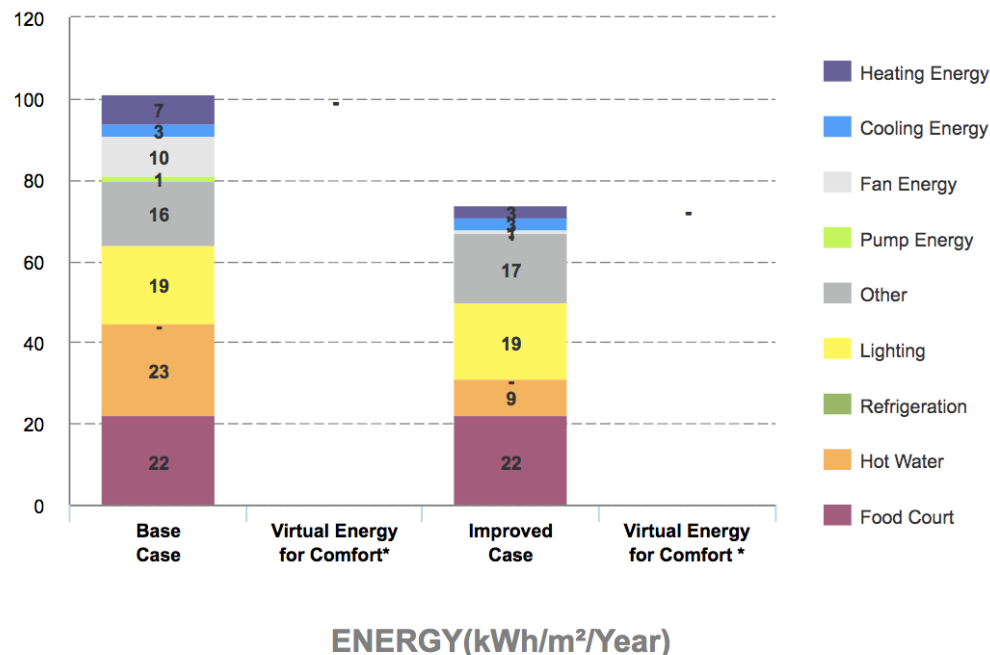
Payback in Years

0.3

Operational CO₂ Savings

483 tCO₂/Year

26.97% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– FIJI CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 22% Savings through:

- Insulation of External Walls, Natural Ventilation
- Variable Frequency Drives in Air Handling Units
- Energy Saving Light Bulbs in Food Court



Water – 46% Savings through:

- Rainwater Harvesting System
- Water Efficient, Auto Shut-Off Faucets



Materials – 32% Savings through:

- Re-use of Existing Floorslab

PROJECTED PROJECT METRICS

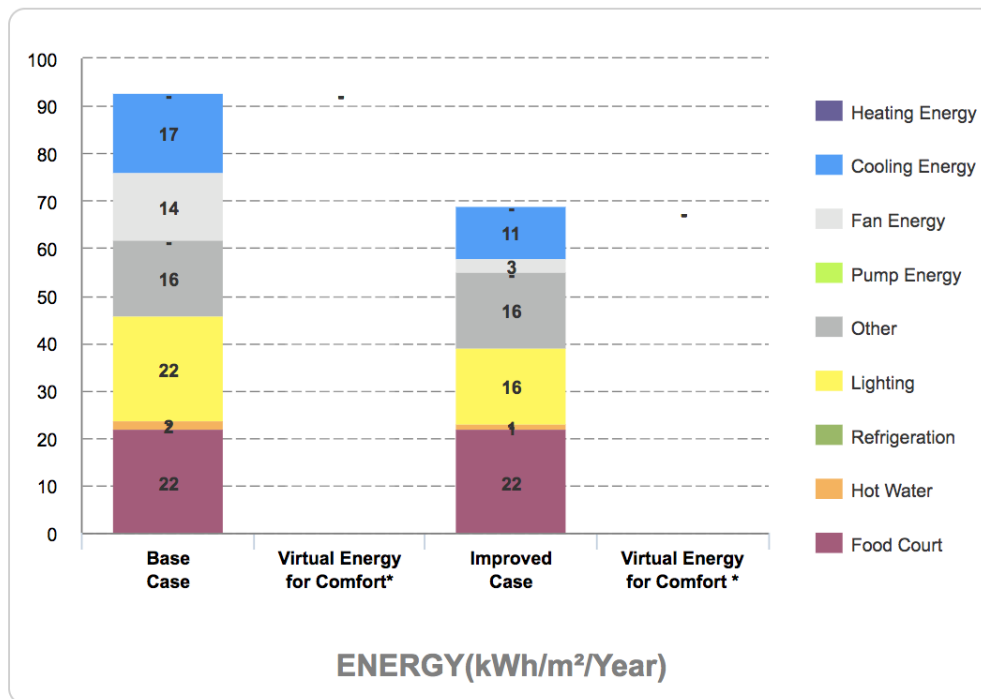
Incremental Cost
\$1,000

Utility Cost Savings
\$200 / month

Payback in Years
0.5

Operational CO₂ Savings
151 tCO₂/Year

26.62% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– INDONESIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 21% Savings through:

- Variable Frequency Driver in Air Handling Units
- Air Conditioning with Air Cooled Screw Chiller
- Solar Hot Water Collectors



Water – 55% Savings through:

- Dual Flush, Water-Efficient Urinals
- Auto Shut-off, Efficient Faucets
- Rainwater Harvesting System



Materials – 42% Savings through:

- Re-use of Existing Floorslab

PROJECTED PROJECT METRICS

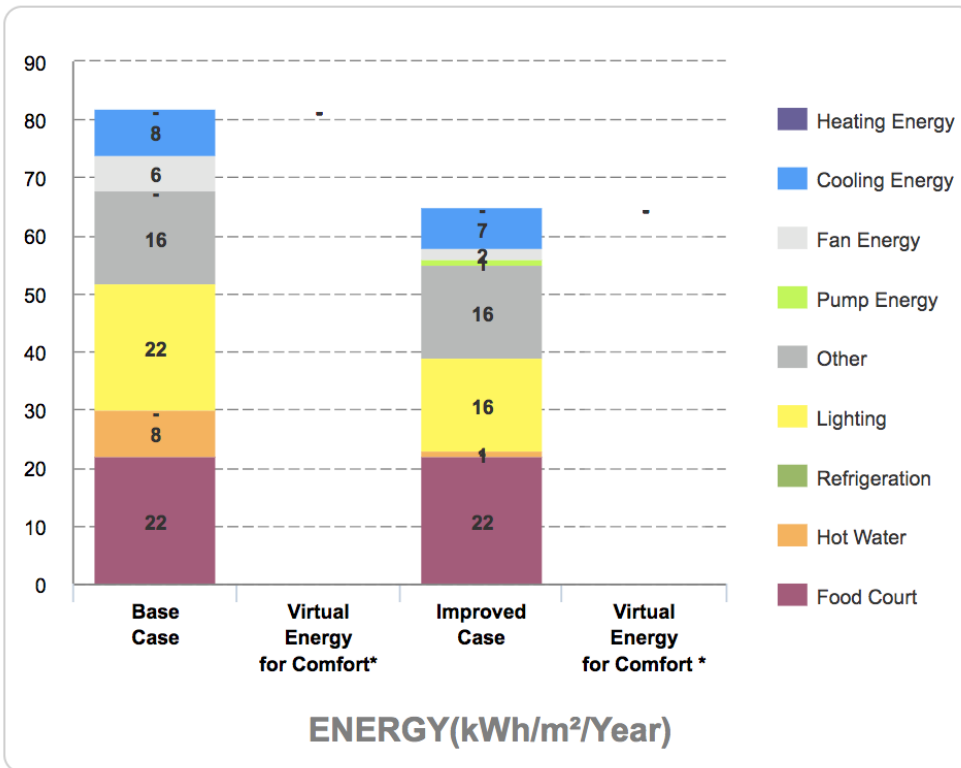
Incremental Cost
727,000 Thousand Rp

Utility Cost Savings
60,000 Thousand Rp / month

Payback in Years
1

Operational CO₂ Savings
184.78 tCO₂/Year

20.90% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– PHILIPPINES CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 25% Savings through:

- Variable Frequency Driver in Air Handling Units
- Air Conditioning with Air Cooled Screw Chiller
- Solar Hot Water Collectors



Water – 74% Savings through:

- Dual Flush, Water-Efficient Urinals
- Auto Shut-off, Efficient Faucets
- Rainwater Harvesting System



Materials – 42% Savings through:

- Re-use of Existing Floorslab

PROJECTED PROJECT METRICS

Incremental Cost

2,646,000 PhP

Utility Cost Savings

525,000 PhP / month

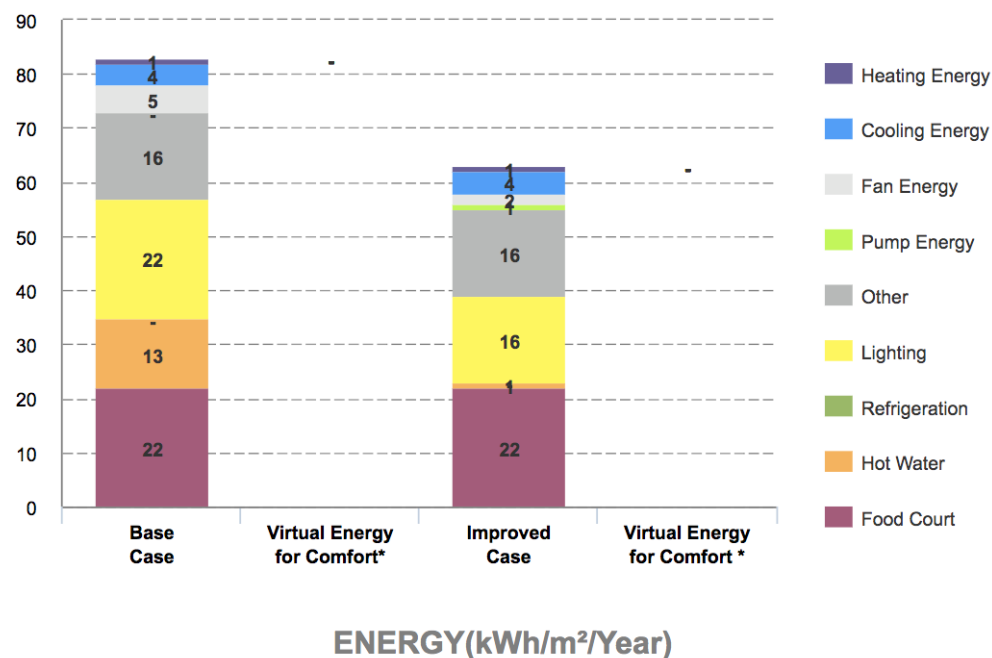
Payback in Years

0.4

Operational CO₂ Savings

143 tCO₂/Year

24.72% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– THAILAND CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 20% Savings through:

- Demand-Controlled Ventilation for Fresh Air Intake
- Energy Saving Light Bulbs in Food Court
- Skylights, Solar Hot Water Collectors



Water – 54% Savings through:

- Dual Flush Water Closets
- Water-Efficient Urinals, Faucets
- Rainwater Harvesting Systems



Materials – 42% Savings through:

- Re-use of Existing Floorslab

PROJECTED PROJECT METRICS

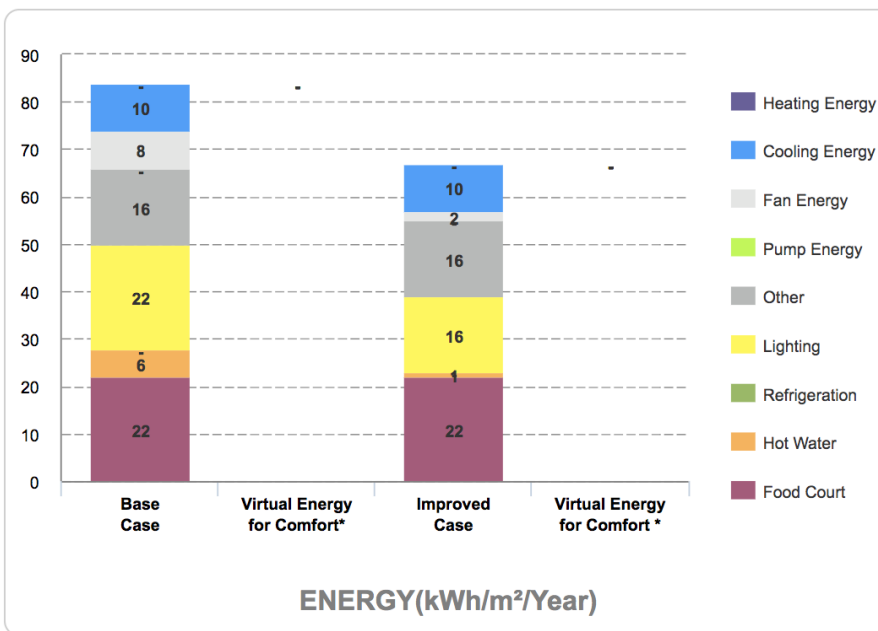
Incremental Cost
\$18,000

Utility Cost Savings
\$1,500 / month

Payback in Years
1

Operational CO₂ Savings
126.25 tCO₂/Year

20.02% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– VIETNAM CASE STUDY

BUILDING DETAILS

Floors Above Ground	Floors Below Ground	Gross Internal Area
1	0	15,000 m ²



Energy Measures – 27% Savings through:

- Insulation of External Walls, Natural Ventilation
- Variable Frequency Drives in Air Handling Units
- Demand-Controlled Ventilation
- Energy-Saving Light Bulbs, Skylights



Water – 46% Savings through:

- Rainwater Harvesting Systems, Auto Shut-off Faucets



Materials – 32% Savings through:

- Timber Floor Construction Floor Slabs

PROJECTED PROJECT METRICS

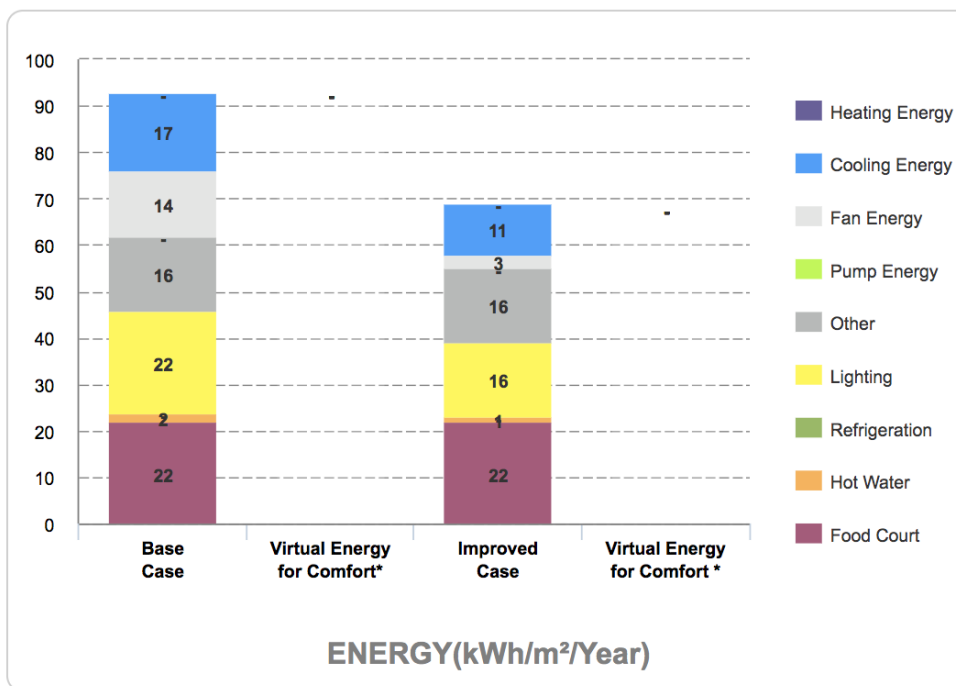
Incremental Cost
430 M VND

Utility Cost Savings
72 M VND / month

Payback in Years
0.5

Operational CO₂ Savings
121 tCO₂/Year

26.62% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.



GREEN BUILDINGS RETURN ON INVESTMENT: INDUSTRIAL IN SOUTH ASIA



Creating Markets, Creating Opportunities

BUILDING DETAILS

Floors Above Ground	Shifts in a Day	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 21% Savings through:

- Reflective Paint/Tiles for Roof
- Skylight to provide daylight to 50% of top floor
- Variable frequency drive in AHU's



Water – 25% Savings through:

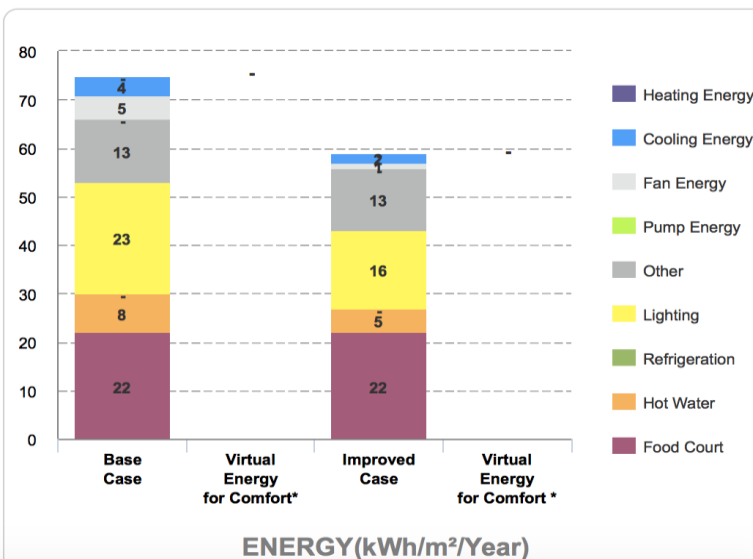
- Auto Shut-off faucets
- Rainwater Harvesting System



Materials – 27% Savings through

- In-Situ concrete > 30% PFA
- Autoclaved Aerated Concrete Blocks for external wall

21.46% Meets EDGE energy standard



PROJECT METRICS

Incremental Cost

\$5,660

Utility Costs Savings

\$1,820 / month

Payback in Years

0.3

Operational CO₂

Savings

152 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window To Wall Ratio
- Reflective paint of Roofs and External Walls
- Variable Refrigerant Flow cooling system
- Energy-Saving Lighting System for Internal and External Spaces



Water – 22% Savings through:

- Low-flow Faucets In Bathrooms
- Black water treatment and recycling system



Materials – 28% Savings through:

- Thinner In-Site concrete slabs with less rebar for floor and slab
- Ceramic Tile Flooring



SONG HAU SURFACE WATER PLANT (VIETNAM)

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

LIGHT INDUSTRY – INDIA (DELHI) CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Floors Above Ground	Shifts in a Day	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 36% Savings through:

- Reflective Paint/Tiles for Roof
- Skylight to provide daylight to 50% of top floor
- Solar Photovoltaic for power requirements



Water – 22% Savings through:

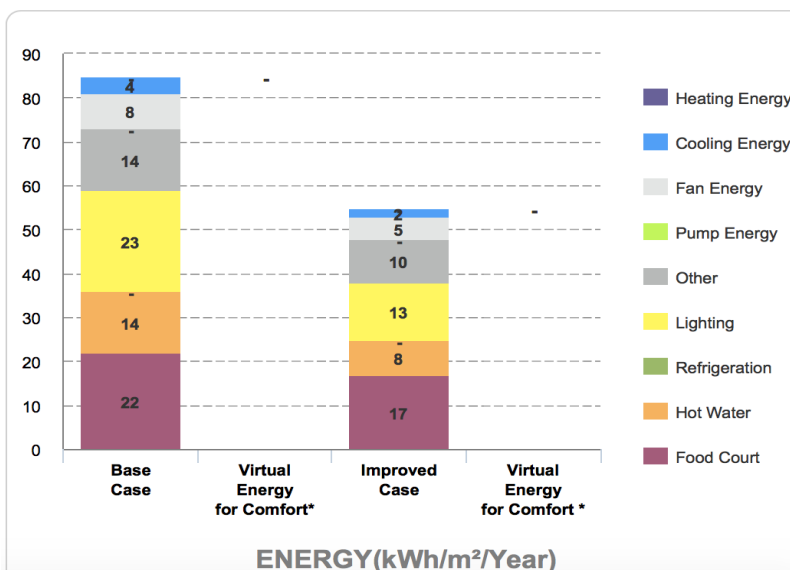
- Auto Shut-off faucets
- Rainwater Harvesting System
- Dual faucets for all bathrooms



Materials – 21% Savings through:

- In-Situ concrete > 30% PFA
- Autoclaved Aerated Concrete for external wall

35.53% Meets EDGE energy standard



PROJECTED PROJECT METRICS

Incremental Cost
Rs 9,058,465

Utility Costs Savings
Rs 513,650 / month

Payback in Years
1.5

Operational CO₂ Savings
328 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 38% Savings through:

- Reduced Window To Wall Ratio
- Reflective paint of Roofs and External Walls
- Variable Refrigerant Flow cooling system
- Energy-Saving Lighting System for Internal and External Spaces
- Skylight to provide daylight to 50% of top floor area



Water – 23% Savings through:

- Single flush and flush valve for water closet in all bathrooms
- Water efficient urinals in all bathrooms
- Aerated and auto shutoff faucets in all bathrooms



Materials – 63% Savings through:

- Steel sheet on steel rafter for roof construction
- Medium weight hollow concrete blocks for external walls
- Plastic board on metal studs for internal walls and finishing concrete



LATAM PARQUE LOGISTICO LIMA SUR

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

BUILDING DETAILS

Floors Above Ground	Shifts in a Day	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 34% Savings through:

- Reflective Paint/Tiles for Roof
- Skylight to provide daylight to 50% of top floor area
- Solar Photovoltaic for power requirement



Water – 28% Savings through:

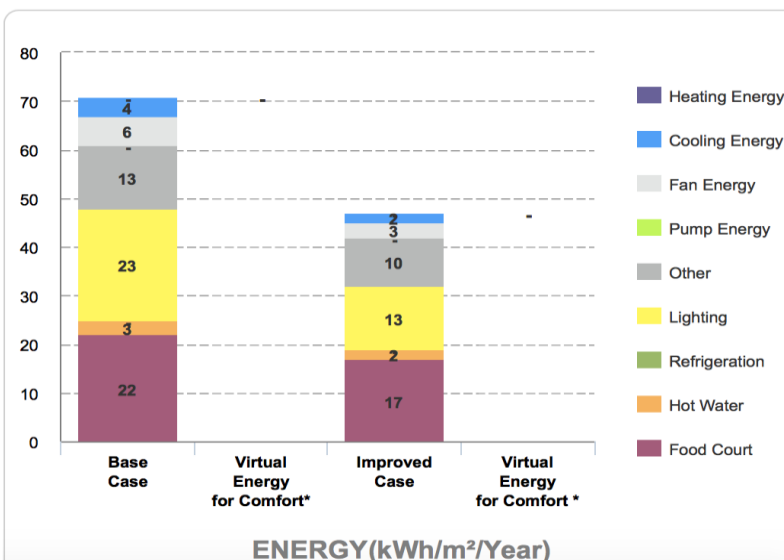
- Rainwater Harvesting System



Materials – 27% Savings through:

- In-Situ concrete > 30% PFA
- Autoclaved Aerated Concrete Blocks for external and internal walls
- Ceramic Tiles

34.48% Meets EDGE energy standard



PROJECTED PROJECT METRICS

Incremental Cost
Rs 8,883,220

Utility Costs Savings
Rs 435,735 / month

Payback in Years
1.7

Operational CO₂ Savings
265 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 27% Savings through:

- Reduced Window To Wall Ratio
- Reflective paint of Roofs and External Walls
- Energy-Saving Lighting System for Internal and External Spaces
- Skylight to provide daylight to 50% of top floor area



Water – 26% Savings through:

- Dual flush water closet in all bathrooms



Materials – 25% Savings through:

- Steel sheet on steel rafter for roof construction
- Finished concrete flooring



TPARK BANGPLEE 4

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

BUILDING DETAILS

Floors Above Ground	Shifts in a Day	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 22% Savings through:

- Reflective Paint/Tiles for Roof
- Skylight to provide daylight to 50% of top floor area



Water – 29% Savings through:

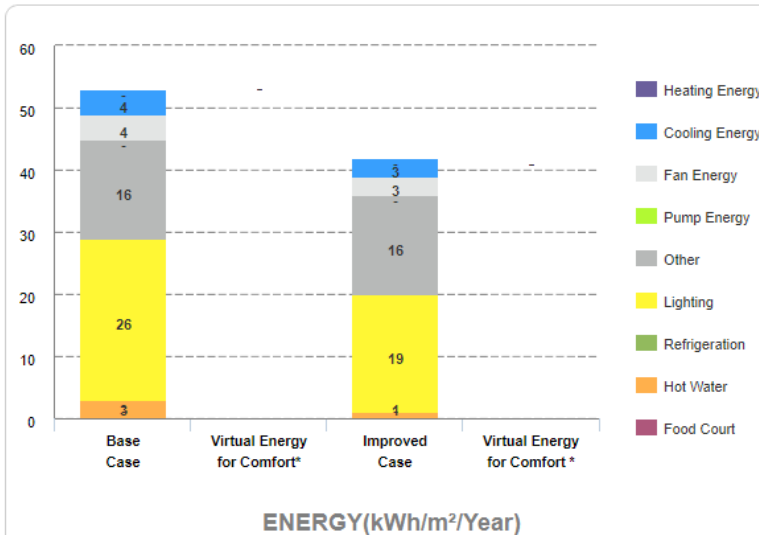
- Auto Shut-off faucets
- Rainwater Harvesting System



Materials – 25% Savings through:

- Concrete Filler Slab

22.21% Meets EDGE energy standard



PROJECT METRICS

Incremental Cost

\$22,470

Utility Costs Savings

\$2,185 / month

Payback in Years

1

Operational CO₂ Savings

445 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window To Wall Ratio
- Reflective paint of Roofs and External Walls
- Variable Refrigerant Flow cooling system
- Energy-Saving Lighting System for Internal and External Spaces



Water – 22% Savings through:

- Low-flow Faucets In Bathrooms
- Black water treatment and recycling system



Materials – 28% Savings through:

- Thinner In-Site concrete slabs with less rebar for floor and slab
- Ceramic Tile Flooring



SONG HAU SURFACE WATER PLANT (VIETNAM)

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



GREEN BUILDINGS RETURN ON INVESTMENT: LIGHT INDUSTRIAL IN AFRICA



Creating Markets, Creating Opportunities

LIGHT INDUSTRY– ANGOLA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 25% Savings through:

- Reflective Paint/Tiles for Roof, External Areas
- Energy-Saving Lightbulbs
- Skylights
- Solar Hot Water Collectors
- Solar Photovoltaics



Water – 24% Savings through:

- Dual Flush for Water Closets
- Water-Efficient Urinals in all Bathrooms



Materials – 26% Savings through:

- In-Situ Trough Concrete Slab

PROJECTED PROJECT METRICS

Incremental Cost

\$182,630

Utility Costs Savings

\$10,535 / month

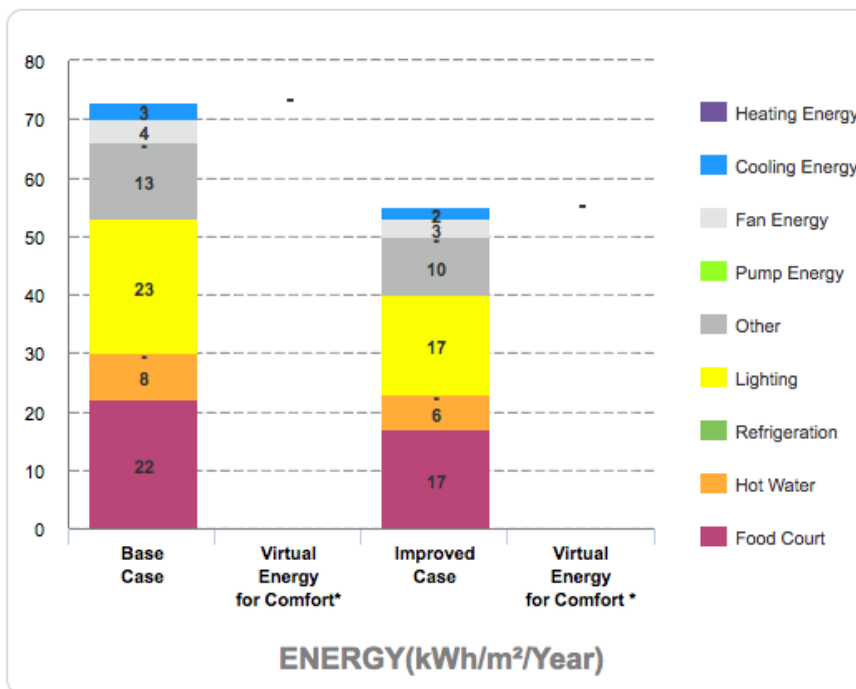
Payback in Years

1.4

Operational CO₂ Savings

169 tCO₂/Year

25.07% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– COTE D'IVOIRE CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 21% Savings through:

- Reflective Paint/Tiles for Roof, External Areas
- Natural Ventilation
- Variable Frequency Drives in AHUs
- Energy-Saving Lightbulbs
- Solar Hot Water Collectors
- Skylights



Water – 24% Savings through:

- Dual Flush for Water Closets
- Water-Efficient Urinals



Materials – 22% Savings through:

- In-situ waffle concrete slab

PROJECTED PROJECT METRICS

Incremental Cost

\$58,620

Utility Costs Savings

\$2,220 / month

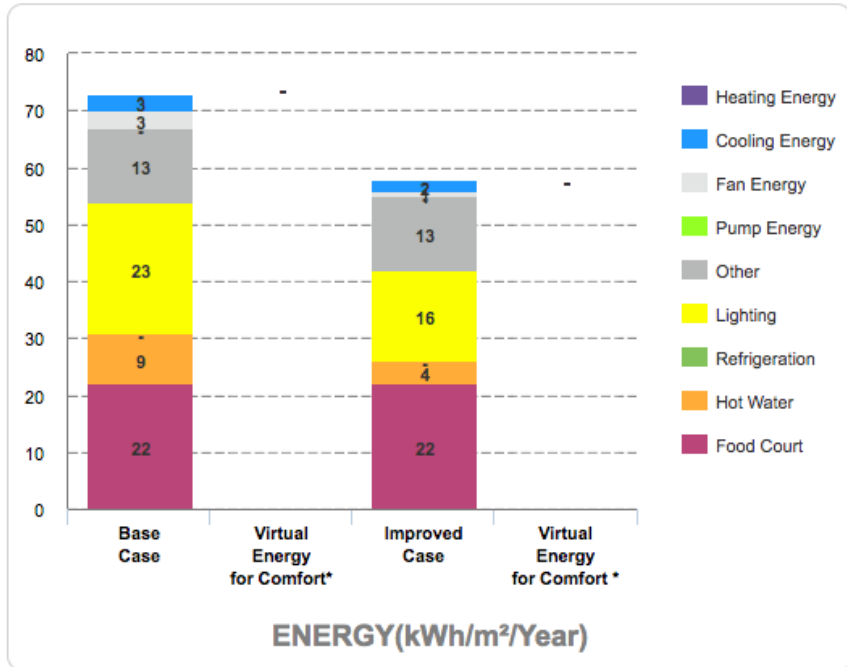
Payback in Years

2.2

Operational CO₂ Savings

109 tCO₂/Year

21.23% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– GHANA CASE STUDY



BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 35% Savings through:

- Solar Hot Water Collectors
- Solar Photovoltaics
- Skylights



Water – 21% Savings through:

- Water-Efficient Kitchen Faucets
- Grey Water Treatment and Recycling System



Materials – 27% Savings through:

- In-situ trough concrete slab

PROJECTED PROJECT METRICS

Incremental Cost

\$173,580

Utility Costs Savings

\$14,870 / month

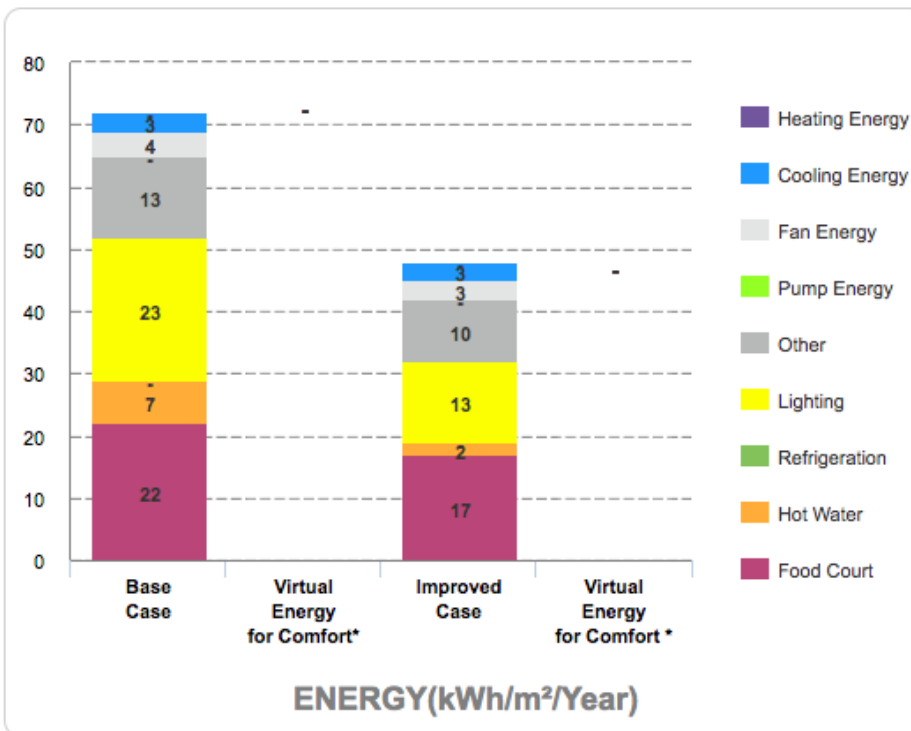
Payback in Years

1

Operational CO₂ Savings

148 tCO₂/Year

35.35% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– KENYA CASE STUDY



BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 23% Savings through:

- Solar Hot Water Collectors
- Skylights



Water – 38% Savings through:

- Dual Flush for Water Closets
- Aerators & Auto Shut-off Faucets
- Water-Efficient Kitchen Faucets



Materials – 27% Savings through:

- In-situ trough concrete slab

PROJECTED PROJECT METRICS

Incremental Cost

\$38,100

Utility Costs Savings

\$3,810 / month

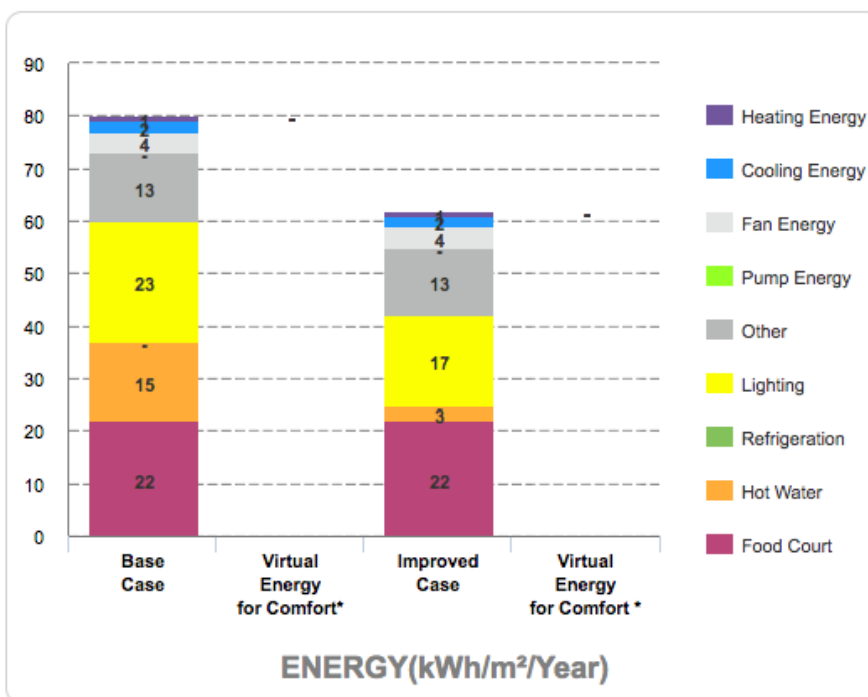
Payback in Years

0.8

Operational CO₂ Savings

115 tCO₂/Year

22.26% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– NIGERIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 22% Savings through:

- Variable Frequency Drives in AHUs
- Energy-Saving Light Bulbs in Food Court
- Solar Hot Water Collectors
- Skylights



Water – 47% Savings through:

- Dual Flush for Water Closets
- Water-Efficient Urinals in all Bathrooms
- Aerators and Auto Shut-Off Faucets
- Water-Efficient Kitchen Faucets
- Grey Water Treatment & Recycling System



Materials – 25% Savings through:

- Concrete filler slab

PROJECTED PROJECT METRICS

Incremental Cost

\$24,430

Utility Costs Savings

\$2,260 / month

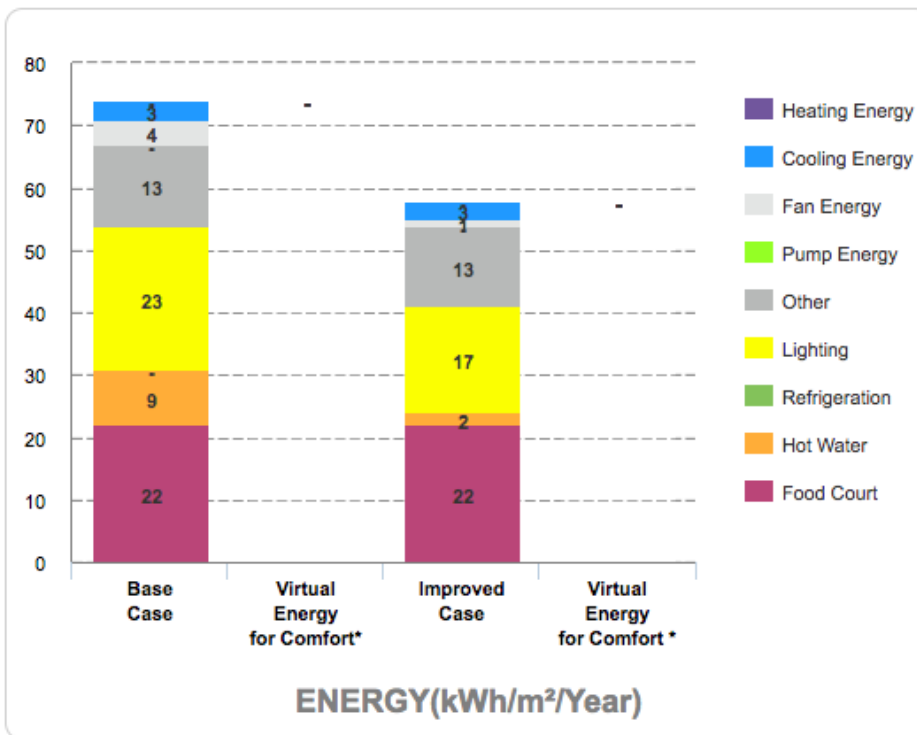
Payback in Years

0.9

Operational CO₂ Savings

94 tCO₂/Year

21.77% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– SOUTH AFRICA CASE STUDY



BUILDING DETAILS

Floors Above Ground	Shifts	Gross Internal Area
1	1 (8hrs, 6 d/wk)	15,000 m ²



Energy Measures – 22% Savings through:

- Energy Saving interior Light Bulbs
- Solar Hot Water Collectors for 50% of Hot Water
- Skylight(s) to Provide Daylight



Water – 24% Savings through:

- Dual Flush for Water Closets
- Single Flush/Flush Valve
- Water-Efficient Urinals in all Bathrooms



Materials – 28% Savings through:

- Composite In-Situ Concrete and Steel Deck

PROJECTED PROJECT METRICS

Incremental Cost

ZAR 658,940

Utility Cost Savings

ZAR 46,540 / month

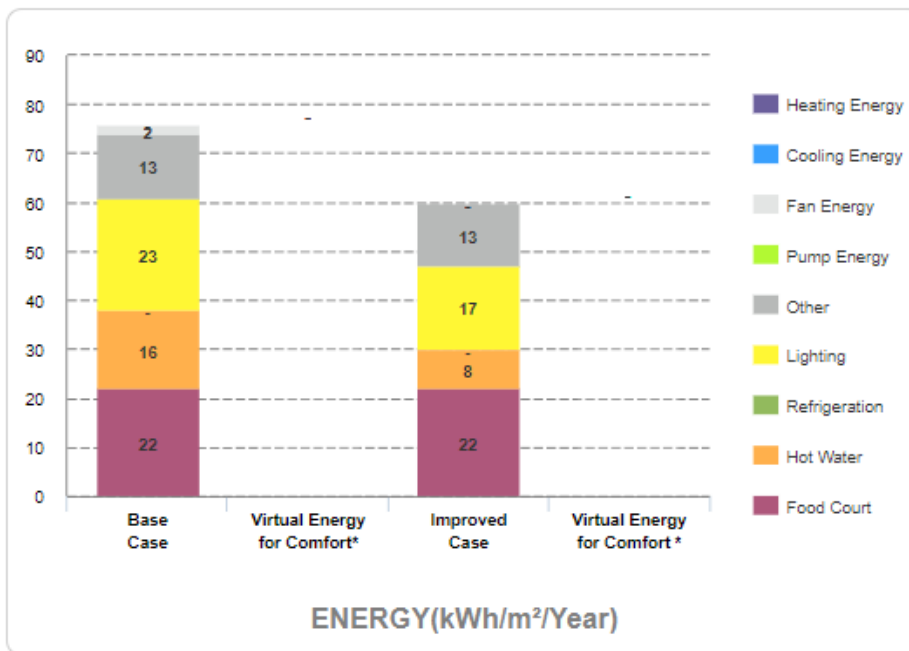
Payback in Years

1.2

Operational CO₂ Savings

230 tCO₂/Year

20.04% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.



GREEN BUILDINGS RETURN ON INVESTMENT: LIGHT INDUSTRIAL IN LATIN AMERICA



Creating Markets, Creating Opportunities

LIGHT INDUSTRY– ARGENTINA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 25% Savings through:

- Skylights
- Occupancy Sensors in Bathrooms
- Reflective Paint for Roof and External Walls
- High Efficiency Boiler for Water Heating



Water – 35% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerator and Auto Shut-off Faucets



Materials – 20% Savings through:

- In-Situ Waffle Concrete Roof Slab

PROJECTED PROJECT METRICS

Incremental Cost

\$70,440

Utility Cost Savings

\$2,470

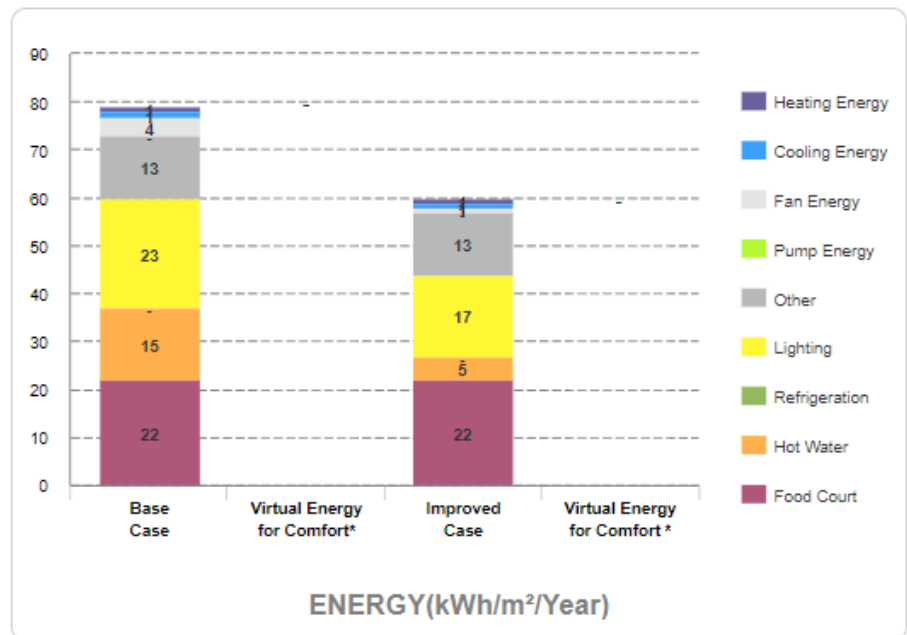
Payback in Years

2.4 Years

Operational CO₂ Savings

143 tCO₂/Year

25.25% Meets EDGE energy standard



LIGHT INDUSTRY– BRAZIL CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 34% Savings through:

- Insulation of Roof and External Wall
- Air Conditioning with Air or Water Cooled Chiller
- Solar Photovoltaics for 25% of Energy Consumption



Water –43% Savings through:

- Dual Flush Water Closet
- Water-Efficient Urinals and Kitchen Sink
- Auto Shut-off, Efficient Faucets



Materials – 24% Savings through:

- Concrete Filler Floor Slab

PROJECTED PROJECT METRICS

Incremental Cost

\$350,470

Utility Cost Savings

\$5,730/month

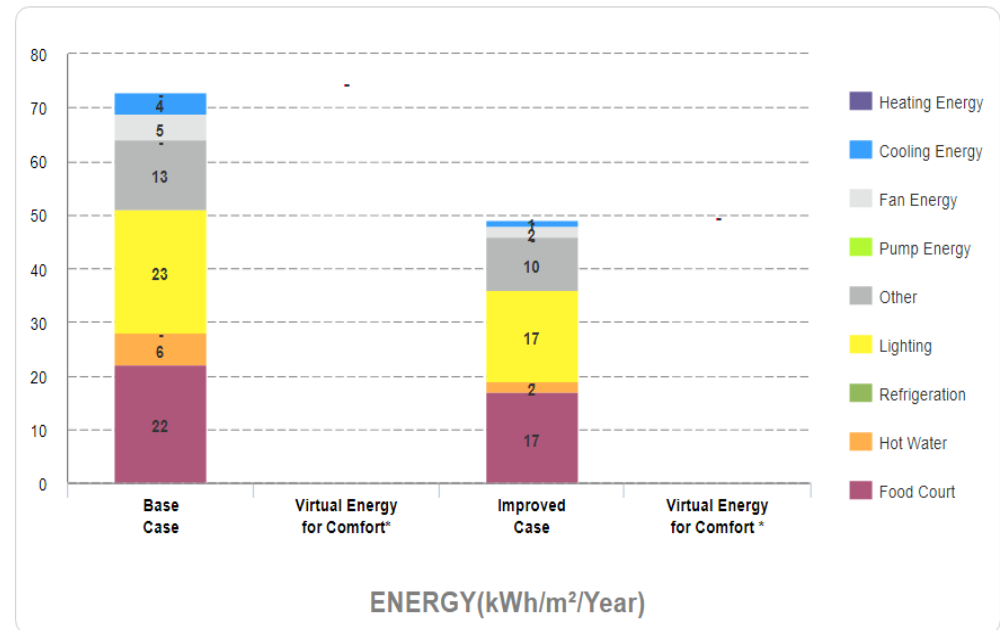
Payback in Years

5.1 Years

Operational CO₂ Savings

315 tCO₂/Year

33.82% Meets EDGE energy standard



LIGHT INDUSTRY– COLOMBIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts (8 hour, 6 work day)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 22% Savings through:

- Skylights
- Occupancy Sensors in Bathrooms
- Reflective Paint for Roof and External Walls
- High Efficiency Boiler for Water Heating



Water – 42% Savings through:

- Low Flow Faucet and Showerhead
- Dual Flush Water Closet
- Water-Efficient Urinal



Materials –24% Savings through:

- Composite Slim Roof Slab with Steel I-Beam

PROJECTED PROJECT METRICS

Incremental Cost

\$78,340

Utility Cost Savings

\$2,320 /month

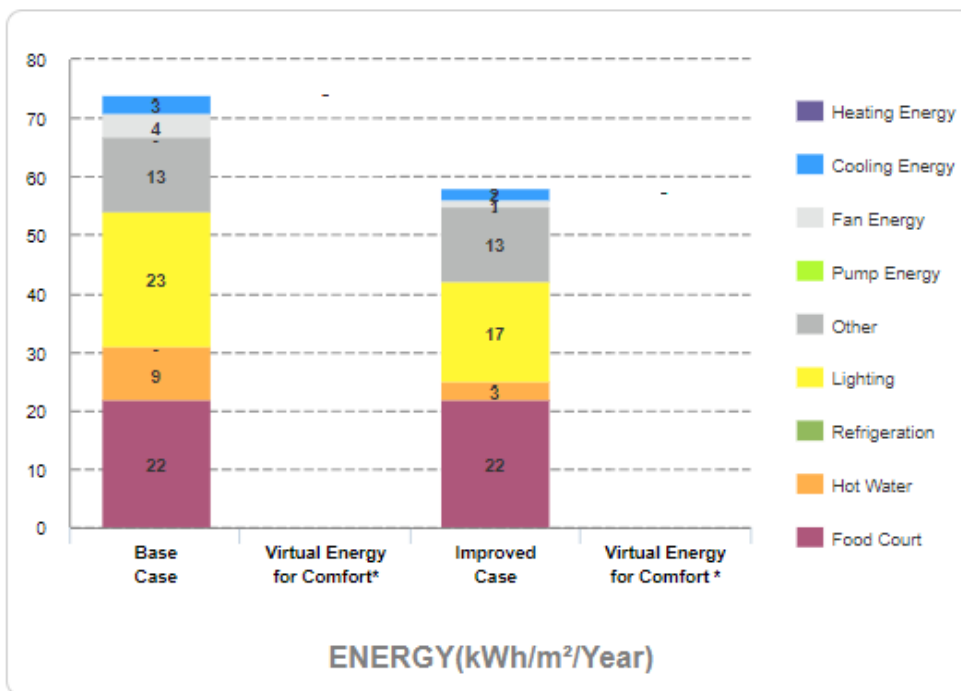
Payback in Years

02.8 Years

Operational CO₂ Savings

66 tCO₂/Year

22.44% Meets EDGE energy standard



LIGHT INDUSTRY– COSTA RICA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts (8 hour, 6 work day)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 29% Savings through:

- Variable Frequency Driver in Air Handling Units
- Air Conditioning with Air Cooled Screw Chiller
- Insulation of External Wall
- Solar Photovoltaics for 25% of Energy Consumption



Water – 34% Savings through:

- Dual Flush Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucets



Materials – 24% Savings through:

- Concrete Filler Slabs for Flooring

PROJECTED PROJECT METRICS

Incremental Cost

254,433,000 CRC

Utility Cost Savings

7,000,000 CRC/month

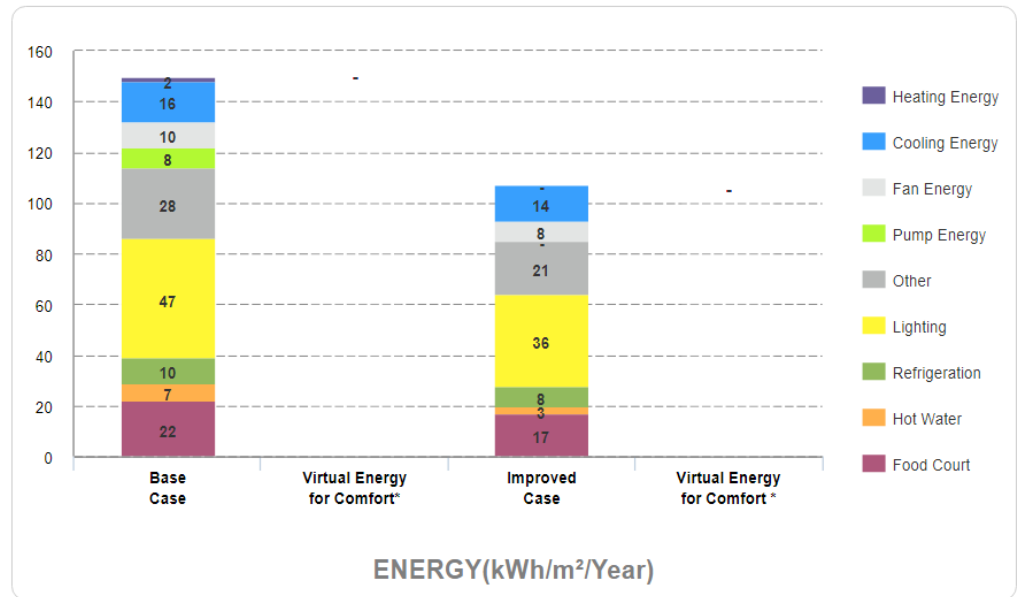
Payback in Years

3 Years

Operational CO₂ Savings

275 tCO₂/Year

29.81% Meets EDGE energy standard



LIGHT INDUSTRY– MEXICO CASE STUDY



BUILDING DETAILS

Floors Above Ground	Shifts (8 hour, 6 work day)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 23% Savings through:

- Variable Frequency Driver Cooling System
- Air Conditioning with Air Cooled Screw Chiller
- Insulation of Roof and External Wall



Water – 45% Savings through:

- Dual Flush Water Closet, Water-Efficient Urinals
- Auto Shut-off Faucet in all Bathrooms
- Water Efficient Kitchen Faucets



Materials – 24% Savings through:

- Concrete Filler Roof Slabs

PROJECTED PROJECT METRICS

Incremental Cost

\$117,490

Utility Cost Savings

\$6,170

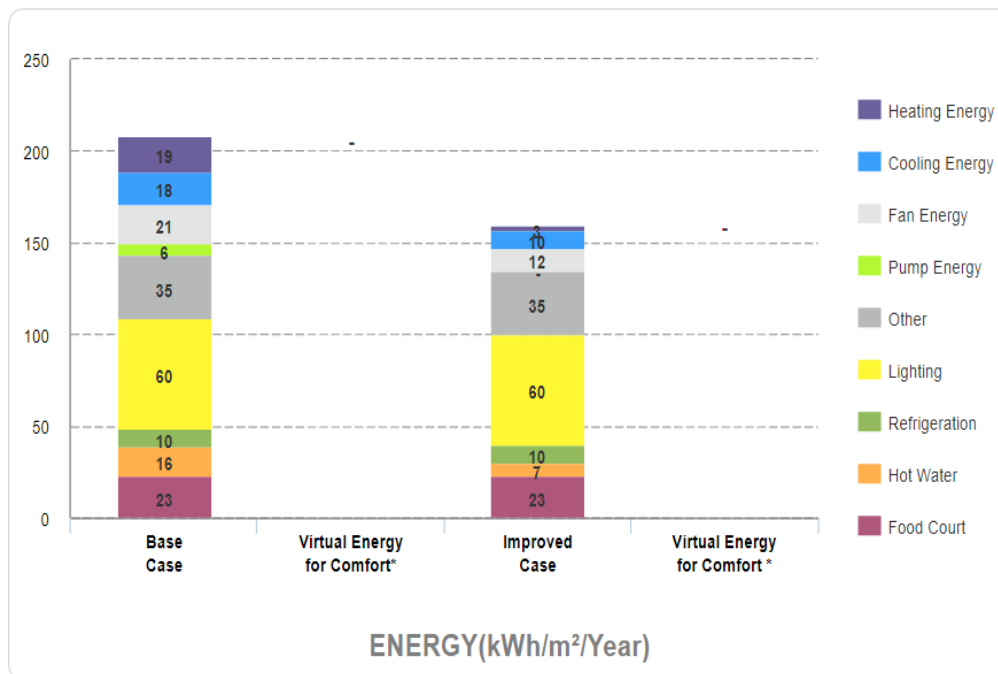
Payback in Years

1.6 Years

Operational CO₂ Savings

1050 tCO₂/Year

22.76% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– PERU CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts (8 hours, 6 work day)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 39% Savings through:

- Solar Photovoltaics - 25% of Total Energy Demand
- Insulation of Roof and External Wall



Water – 36% Savings through:

- Dual Flush Water Closet
- Water-Efficient Urinals
- Auto Shut-off, Efficient Faucets



Materials – 22% Savings through:

- Concrete Filler Slab with Polystyrene Roof Block

PROJECTED PROJECT METRICS

Incremental Cost

1,414,000 S

Utility Cost Savings

43,250 S/month

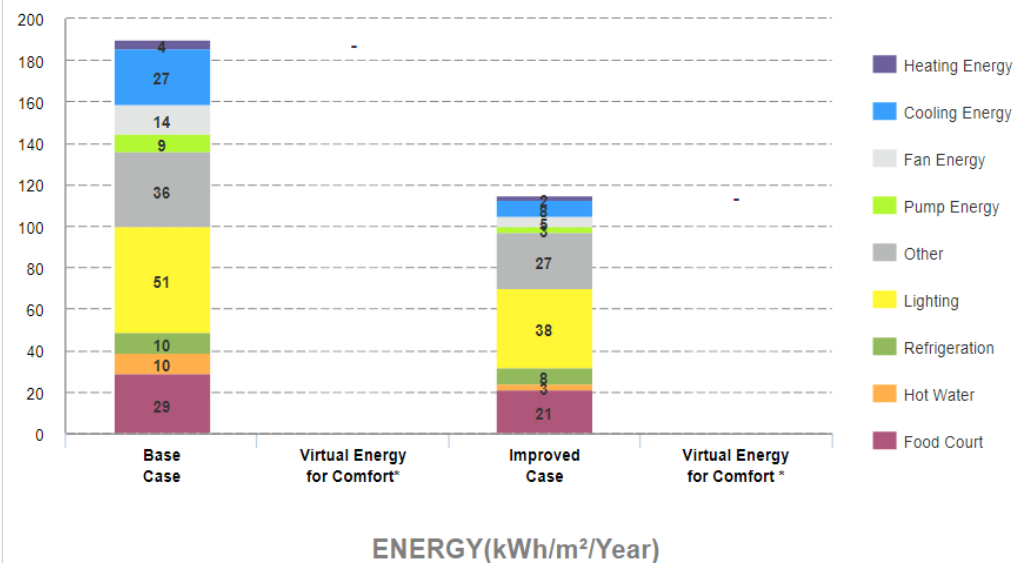
Payback in Years

2.5 Years

Operational CO₂ Savings

790 tCO₂/Year

39.20% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.



GREEN BUILDINGS RETURN ON INVESTMENT: LIGHT INDUSTRIAL IN MENA



Creating Markets, Creating Opportunities

LIGHT INDUSTRY – EGYPT CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Site Area	Car Parking	Landscaped Area	Amenities
15,000 m ²	Indoor Car Parking	1,000,000 m ²	Supermarket, Food Court



Energy Measures – 25% Savings through:

- Solar Photovoltaics - 25% of Total Energy Demand



Water – 24% Savings through:

- Dual Flush for Water Closets in all Bathrooms
- Single Flush/Flush Valve
- Water-Efficient Urinals in all Bathrooms



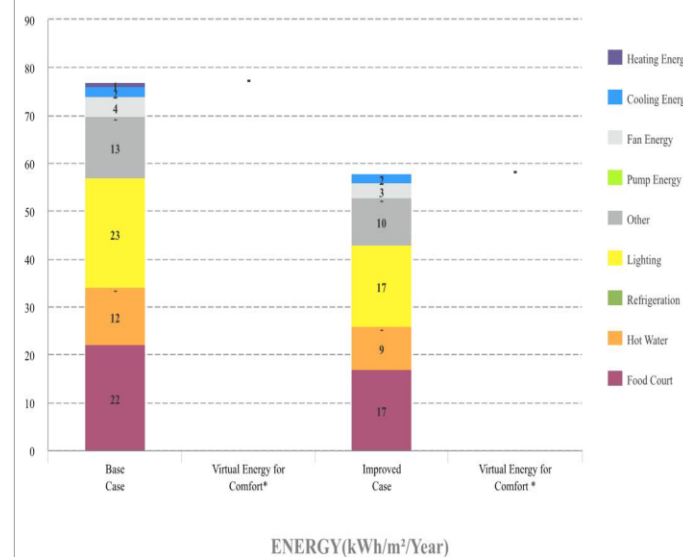
Materials – 22% Savings through:

- Composite Slim with Steel I-Beams

Energy Efficiency measures 25.07%

Energy Savings

Meets EDGE energy standard



PROJECT METRICS

Incremental Cost
\$ 200,000

Utility Costs Savings
\$ 2,500 / month

Payback in Years
6

Operational CO₂
Savings
\$ 120 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 27% Savings through:

- Reduced window to wall ratio
- Reflective paint and tiles for the roof.
- Energy-saving lighting in internal areas.
- Skylights to provide daylight to 50% of top floor areas.



Water – 26% Savings through:

- Dual flush water closets in bathrooms.



Materials – 27% Savings through:

- Steel sheets on steel rafters for roof construction and finished concrete flooring.



TPARK Banglee 4 (Thailand)

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

LIGHT INDUSTRY – JORDAN CASE STUDY & CERTIFIED PROJECT



BUILDING DETAILS

Site Area	Car Parking	Landscaped Area	Amenities
15,000 m ²	Indoor Car Parking	1,000,000 m ²	Supermarket, Food Court



Energy Measures – 25% Savings through:

- Solar Photovoltaics - 25% of Total Energy Demand



Water – 24% Savings through:

- Dual Flush for Water Closets
- Single Flush/Flush Valve
- Water-Efficient Urinals in all Bathrooms



Materials – 22% Savings through:

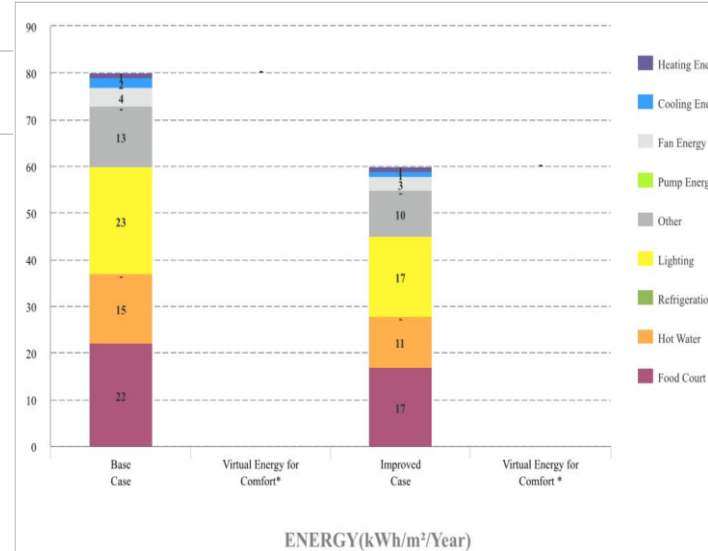
- Composite Slim Slabs with Steel I-Beams

Energy Efficiency measures 25.07%

Energy Savings

Meets EDGE energy stand

PROJECT METRICS



Incremental Cost
\$ 190,000

Utility Costs Savings
\$ 26,500 / month

Payback in Years
1

Operational CO₂
Savings
\$ 180 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 23% Savings through:

- Reduced Window to Wall Ratio.
- Reflective Paint for Roof
- Insulation of roof and walls
- Variable frequency drives in air handling units



Water – 22% Savings through:

- Low-flow faucets in kitchens and bathrooms.
- Black water treatment and recycling system.



Materials – 28% Savings through:

- Thinner in-situ reinforced concrete slab with less steel rebar for floor slabs and roof construction.



Song Hau Surface Water Plant (Vietnam)

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

LIGHT INDUSTRY – MOROCCO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Site Area	Car Parking	Landscaped Area	Amenities
15,000 m ²	Indoor Car Parking	1,000,000 m ²	Supermarket, Food Court



Energy Measures – 25% Savings through:

- Solar Photovoltaics - 25% of Total Energy Demand



Water – 24% Savings through:

- Dual Flush for Water Closets
- Water-Efficient Urinals in all Bathrooms - 2 lt./flush



Materials – 27% Savings through:

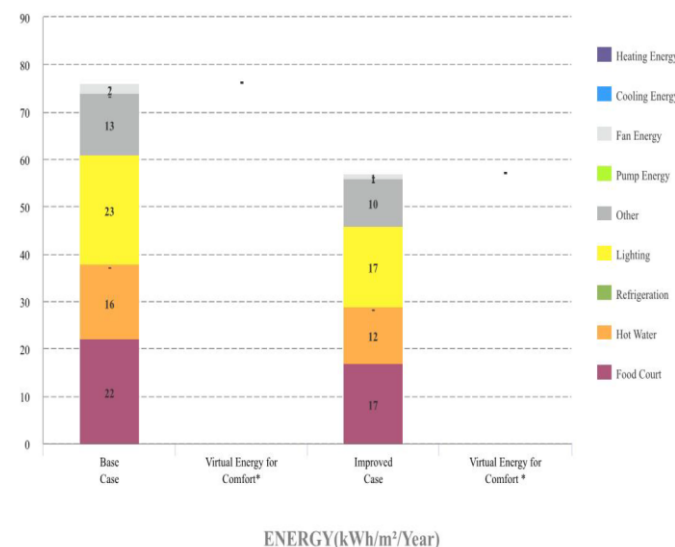
- Composite In-Situ Concrete and Steel Deck

Energy Efficiency measures 25.07%

Energy Savings

Meets EDGE energy standard

PROJECT METRICS



Incremental Cost
\$ 200,000

Utility Costs Savings
\$5,700 / month

Payback in Years
3

Operational CO₂
Savings
\$ 270 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 38% Savings through:

- Reduced Window to Wall Ratio, Reflective Paint for Roof
- insulated roofs and external walls
- Occupancy sensors in bathrooms
- Energy-saving lighting in sales areas corridors and common areas, and external spaces.



Water – 23% Savings through:

- Single flush for water closets
- Water-efficient urinals
- Aerators and auto-shut-off faucets in all bathrooms



Materials – 63% Savings through:

- Steel sheets on steel rafters roof construction
- Cement fibre boards on metal studs for all external walls
- plasterboards on metal studs for internal walls



LatAm Parque Logistico (Peru)

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

LIGHT INDUSTRY – PAKISTAN CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

Site Area	Car Parking	Landscaped Area	Amenities
15,000 m ²	Indoor Car Parking	1,000,000 m ²	Supermarket, Food Court



Energy Measures – 20% Savings through:

- Variable Frequency Drives in AHUs
- Energy Saving Light Bulbs -Internal Areas
- Energy-Saving Light Bulbs - Food Court
- Energy-Saving Light Bulbs - External Spaces
- Solar Hot Water Collectors - 50% of Hot Water Demand



Water – 24% Savings through:

- Dual Flush for Water Closets
- Single Flush/Flush Valve
- Water-Efficient Urinals in all Bathrooms



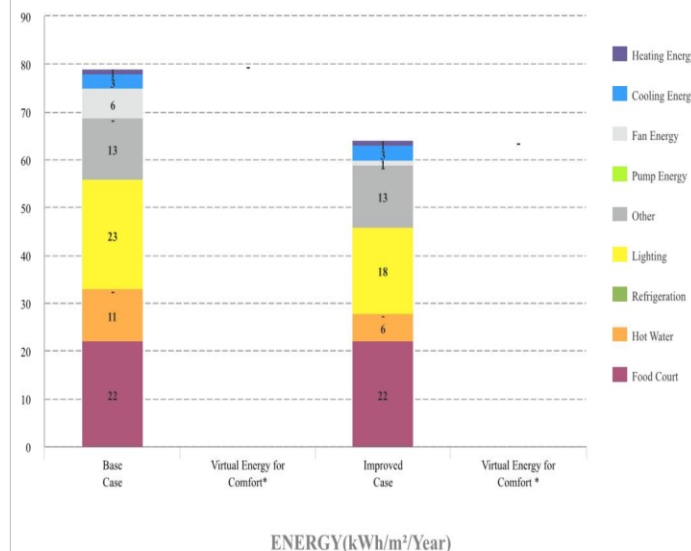
Materials – 81% Savings through:

- Composite In-Situ Concrete and Steel Deck

Energy Efficiency measures 20.12%

Energy Savings

Meets EDGE energy standard



PROJECT METRICS

Incremental Cost
\$ 42,560

Utility Costs Savings
\$ 1,400 / month

Payback in Years
2.5

Operational CO₂
Savings
\$ 100 tCO₂/Year

RELEVANT CERTIFIED PROJECT



Energy Measures – 27% Savings through:

- Reduced window to wall ratio
- Reflective paint and tiles for the roof.
- Energy-saving lighting in internal areas.
- Skylights to provide daylight to 50% of top floor areas.



Water – 26% Savings through:

- Dual flush water closets in bathrooms.



Materials – 27% Savings through:

- Steel sheets on steel rafters for roof construction and finished concrete flooring.



TPARK Banglee 4 (Thailand)

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



GREEN BUILDINGS RETURN ON INVESTMENT: INDUSTRIAL IN EASTERN EUROPE



Creating Markets, Creating Opportunities

LIGHT INDUSTRY– ARMENIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 38% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Solar Photovoltaics



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 24% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$277,043

Utility Costs Savings

\$4,420 / month

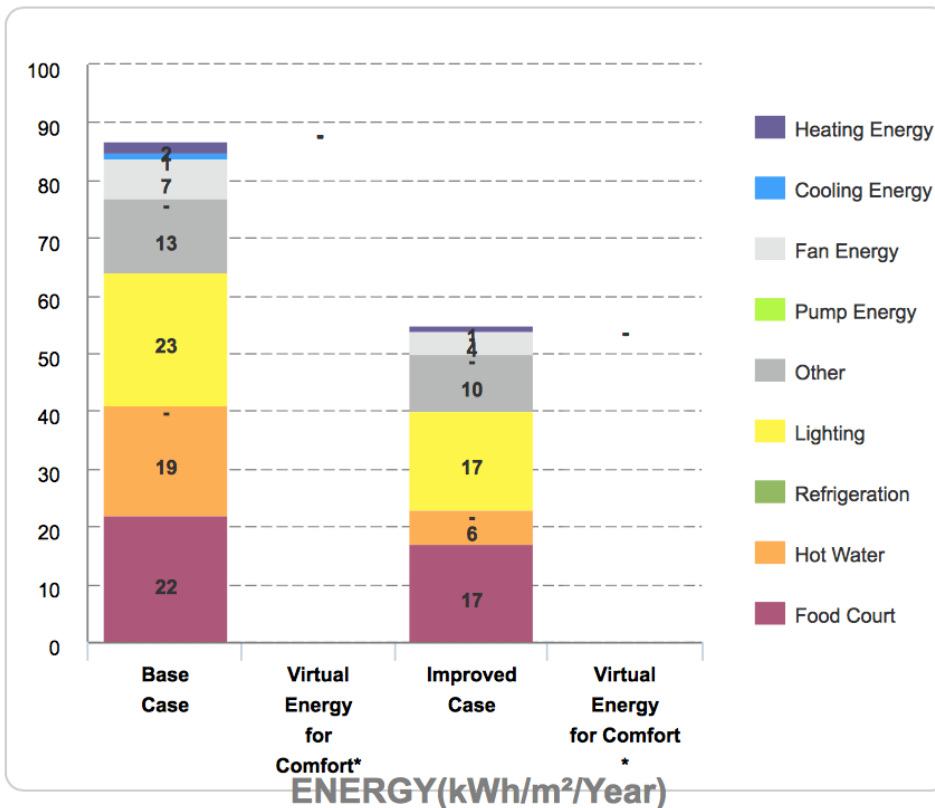
Payback in Years

5.22

Operational CO₂ Savings

207 tCO₂/Year

37.82% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– POLAND CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 20% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Sensible Heat Recovery from Exhaust Air



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 24% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$86,859

Utility Costs Savings

\$9,084 / month

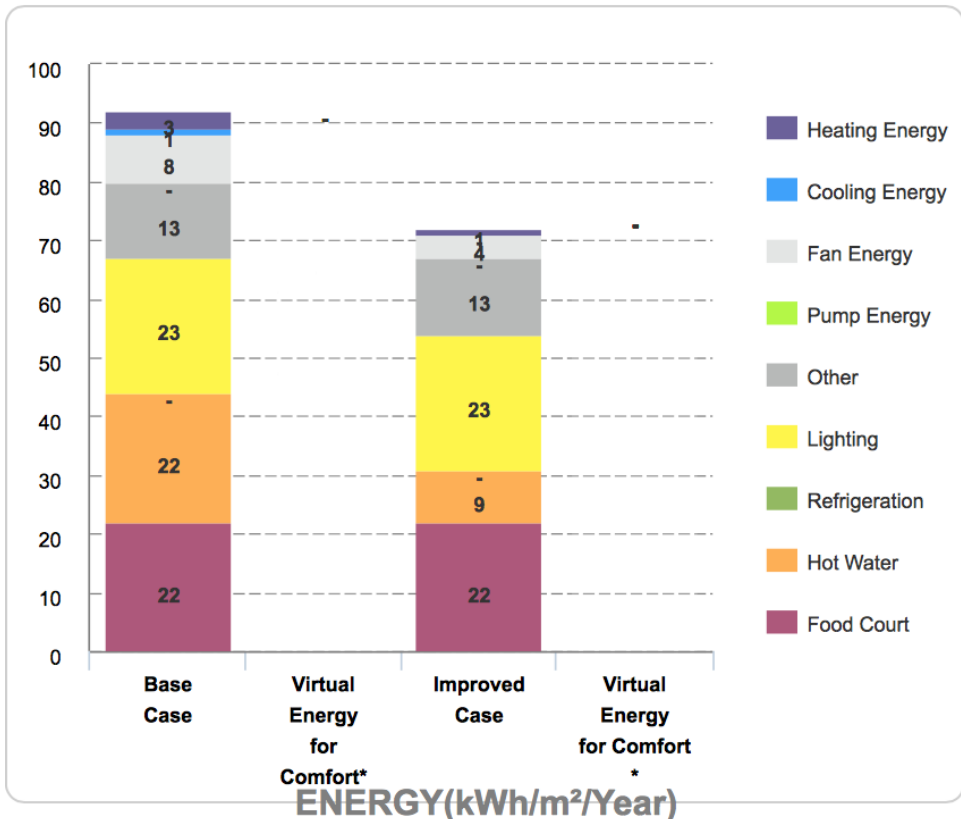
Payback in Years

0.8

Operational CO₂ Savings

213 tCO₂/Year

20.34% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– RUSSIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 23% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Solar Hot Water Collectors



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 25% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$136,651

Utility Costs Savings

\$3,973 / month

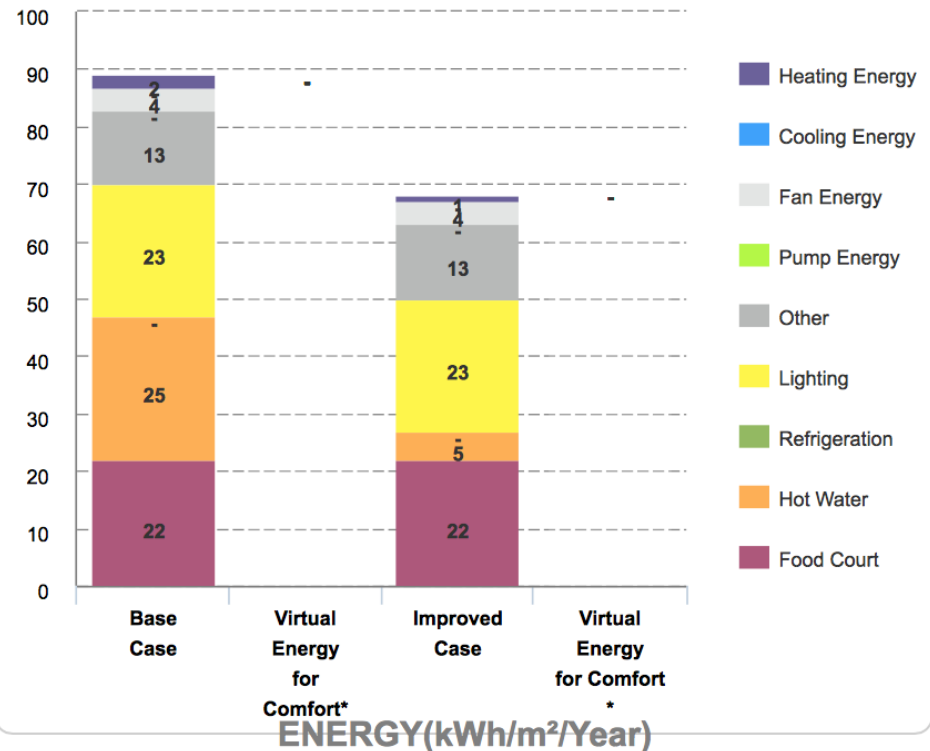
Payback in Years

2.87

Operational CO₂ Savings

127 tCO₂/Year

22.50% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– SERBIA CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 22% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Solar Hot Water Collectors



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 25% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$94,808

Utility Costs Savings

\$25,408 / month

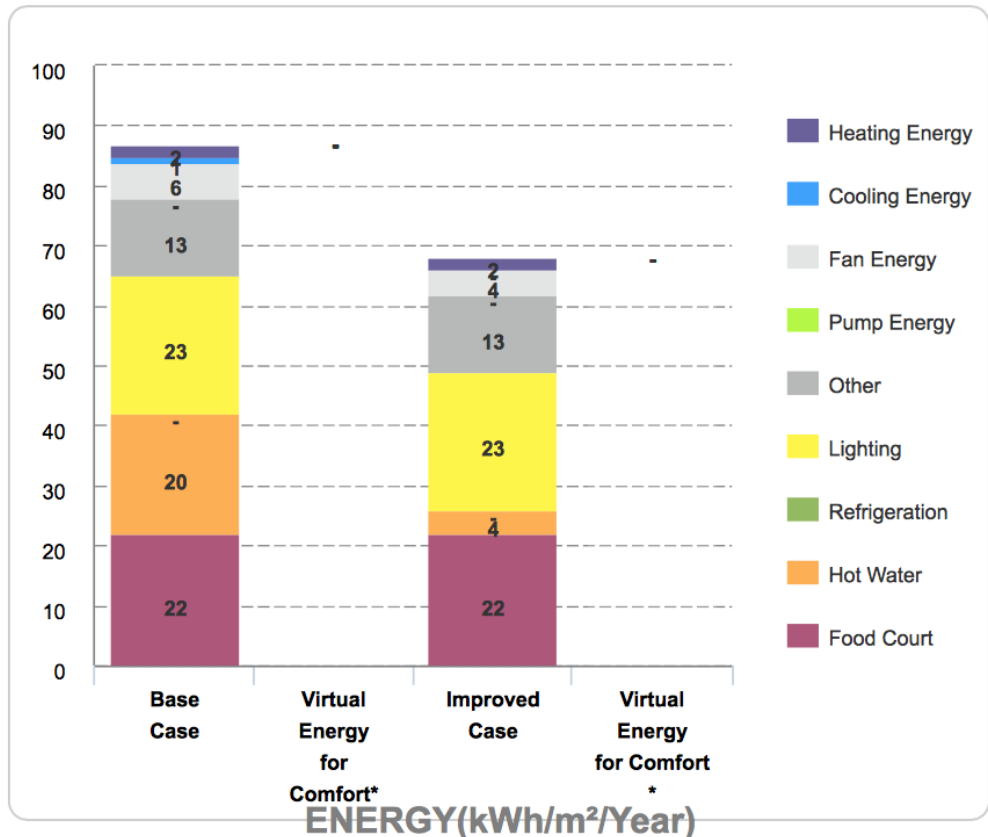
Payback in Years

0.31

Operational CO₂ Savings

229 tCO₂/Year

21.60% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– UKRAINE CASE STUDY

BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 21% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Solar Hot Water Collectors



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 25% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$151,002

Utility Costs Savings

\$1,364 / month

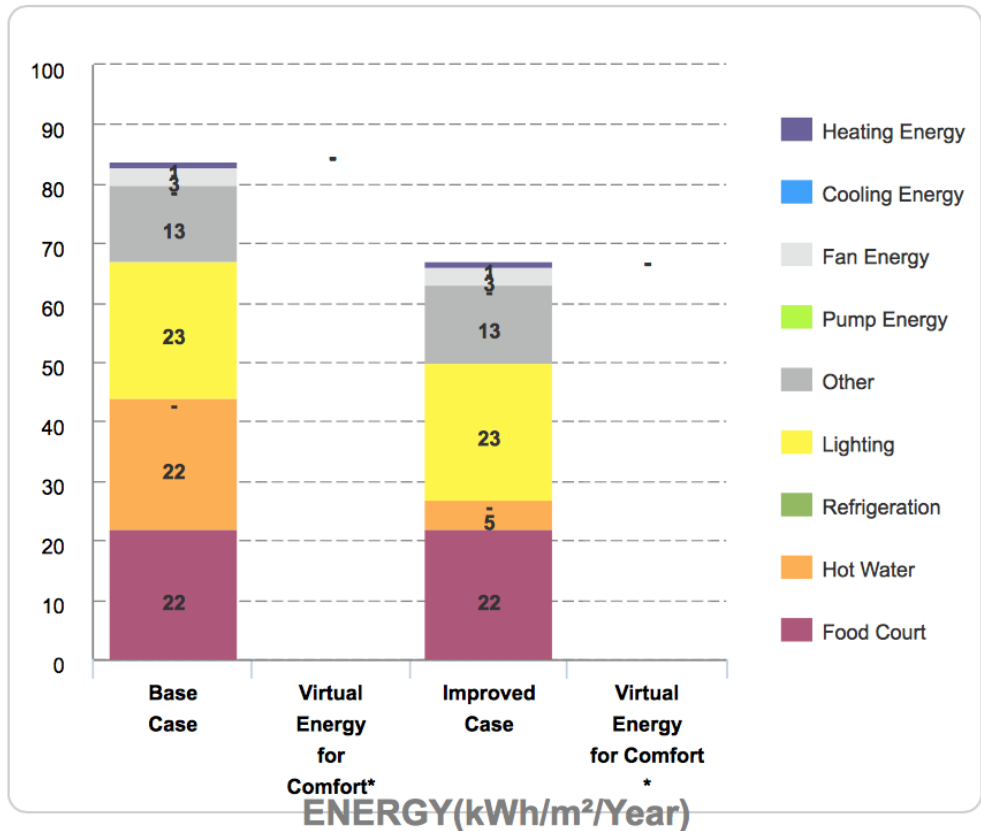
Payback in Years

9.23

Operational CO₂ Savings

158 tCO₂/Year

21.34% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.

LIGHT INDUSTRY– TURKEY CASE STUDY



BUILDING DETAILS

Floors Above Ground	Shifts in a day (8 hour, 6 workday)	Gross Internal Area
1	1	15,000 m ²



Energy Measures – 22% Savings through:

- Reduced Window to Wall ratios
- Insulation of Roof and External Walls
- Variable Refrigerant Volume Cooling System
- Skylight to provide Daylight



Water – 43% Savings through:

- Dual Flush, Water-Efficient Urinals
- Aerators and Auto Shut-off, Efficient Faucets
- Water-Efficient Kitchen Faucets



Materials – 26% Savings through:

- Precast RC Planks and Joist System

PROJECTED PROJECT METRICS

Incremental Cost

\$137,066

Utility Costs Savings

\$5,087 / month

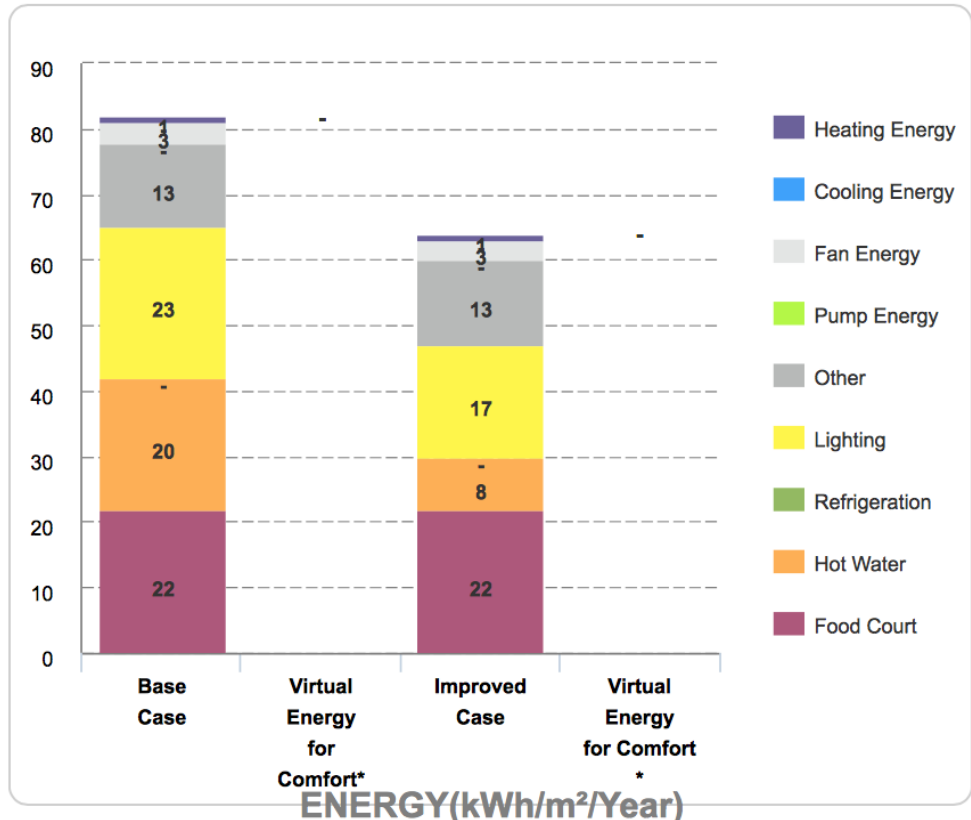
Payback in Years

2.25

Operational CO₂ Savings

102 tCO₂/Year

22.09% Meets EDGE energy standard



Light Industry is a new sector in the EDGE application.
Relevant certified project to be included as soon as case study is published.



METHODOLOGY, NOTES, ACKNOWLEDGMENTS



Creating Markets, Creating Opportunities

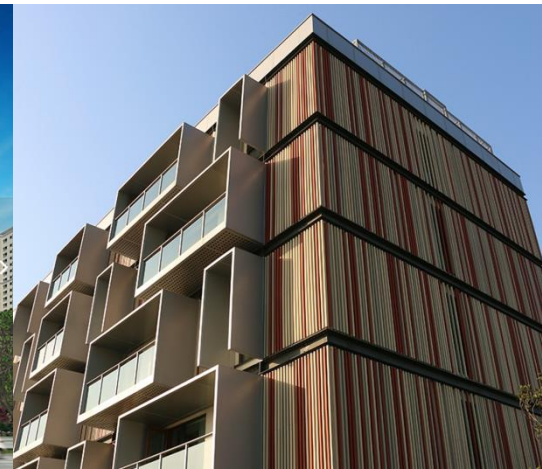
RESEARCH OBJECTIVE: MOST EFFECTIVE INTERVENTIONS TO REACH THE EDGE STANDARD

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.



The image is a composite of three parts. On the left, a laptop displays the EDGE software interface, which includes a project overview, a list of building components, and a bar chart showing energy performance metrics. In the center, a large green circle with a grey border contains the text '20%' in white. On the right, a sample 'EDGE Preliminary Certificate' is shown. The certificate is for a project in South Africa and includes details about the building, the software used, and the certification process. It also features logos for the World Bank Group, IFC, and EDGE.

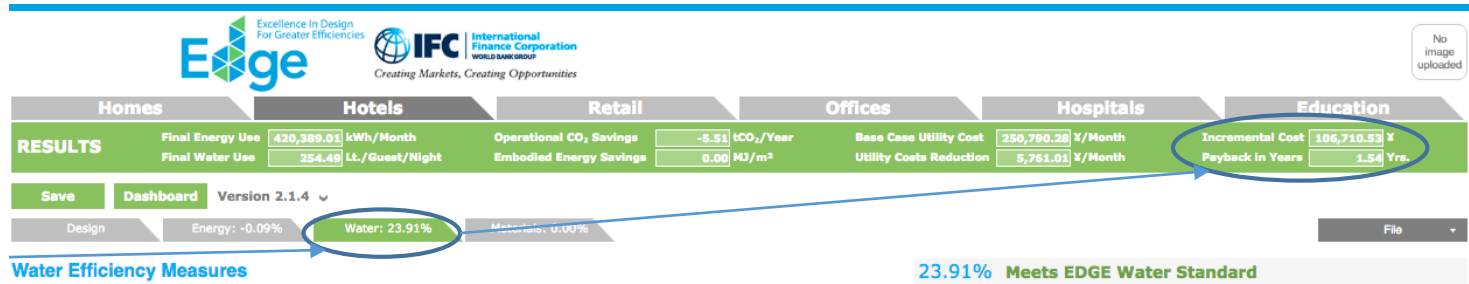
Third party certification verifies the resource efficiency savings so they can be credibly communicated between investors, developers, and buyers.

RESEARCH METHODOLOGY

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

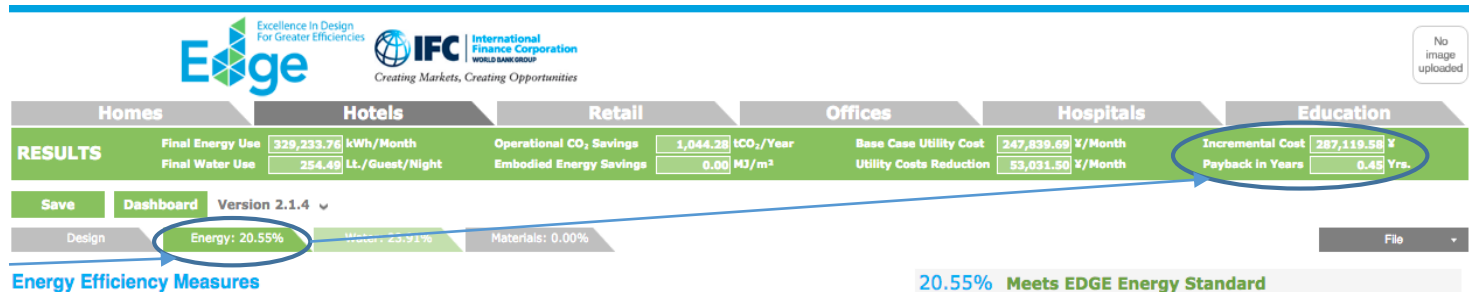
1

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.



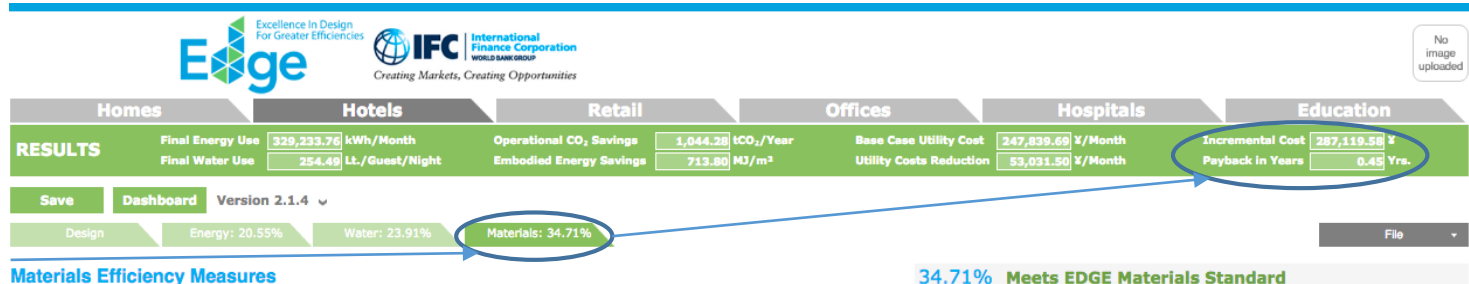
2

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.

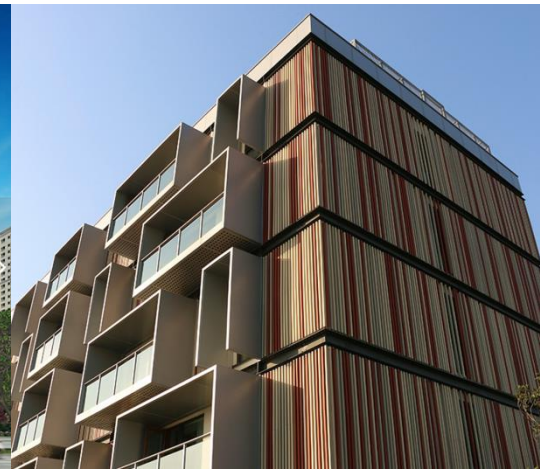


4

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