GREEN BUILDINGS RETURN ON INVESTMENT: LATIN AMERICA REGIONAL TAKE AWAYS

Creating Markets, Creating Opportunities
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ARGENTINA: GREEN BUILDINGS RETURN ON INVESTMENT

IFC | International Finance Corporation
WORLD BANK GROUP

Creating Markets, Creating Opportunities
### ARGENTINA – ROI ON MEASURES NEEDED TO ACHIEVE THE EDGE STANDARD

<table>
<thead>
<tr>
<th></th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>$185/Unit</td>
<td>$6/Unit</td>
<td>2.7</td>
</tr>
<tr>
<td>Hotels</td>
<td>$221,930</td>
<td>$8,725</td>
<td>2.1</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>$156,300</td>
<td>$7,000</td>
<td>1.9</td>
</tr>
<tr>
<td>Offices</td>
<td>$57,100</td>
<td>$1,330</td>
<td>3.6</td>
</tr>
<tr>
<td>Schools</td>
<td>$17,740</td>
<td>$200</td>
<td>7.5</td>
</tr>
<tr>
<td>Hospitals</td>
<td>$452,580</td>
<td>$5,820</td>
<td>6.5</td>
</tr>
<tr>
<td>Light Industry</td>
<td>$70,440</td>
<td>$2,470</td>
<td>2.4</td>
</tr>
</tbody>
</table>
HOMES – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 25% Savings through:
  - Energy Saving Light Bulbs

Water – 21% Savings through:
  - Low-Flow Showerheads
  - Low-Flow Faucets for Washbasins & Kitchen Sinks
  - Dual Flush for Water Closets

Materials – 28% Savings through:
  - Hollow Core Precast Floor Slab
  - Honey Comb Clay Wall With Internal External Plaster
  - External Wall

PROJECT METRICS

Incremental Cost $185/unit
Utility Cost Savings $6/month/unit
Payback in Years 2.7
Operational CO₂ Savings 1.73 tCO₂/Year/unit

RELEVANT CERTIFIED PROJECT

Energy Measures – 27% Savings through:
  - Reduced Window To Wall Ratio
  - Reflective Paint For Roof And Walls
  - External Shading Device
  - Roof Insulation
  - Energy-saving Light Bulbs For Internal, External, And Common Spaces

Water – 30% Savings through:
  - Low-Flow Showerheads
  - Low-Flow Faucets
  - Dual Flush for Water Closet

Materials – 35% Savings through:
  - In-situ trough concrete slab for floor slabs
  - Concrete filler slab with polystyrene blocks for roof construction
  - Honeycomb clay blocks with internal and external plaster for external walls
  - Honeycomb clay blocks with plaster on both sides for internal walls

EDIFICIO VERONA (COLOMBIA)

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/
**HOTELS – ARGENTINA CASE STUDY & CERTIFIED PROJECT**

### BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

**Energy Measures – 24% Savings through:**
- External Shading Device
- Insulation of Roof and External Wall
- Variable Refrigeration Flow and Air Condition
- High Efficient Water Boiler
- Energy Saving Light Bulb

**Water – 37% Savings through:**
- Low-Flow Showerheads and Faucets Guestrooms
- Dual-Flush in Guest Room
- Water Efficient Landscape and Urinals

**Materials – 30% Savings through:**
- Composite Slim Slabs with Steel I-Beam Floor

### RELEVANT CERTIFIED PROJECT

**Energy Measures – 47% Savings through:**
- External Shading Device
- Insulation of Roof and External Walls
- Higher thermal performance glass
- Energy efficient air conditioning with air-cooled screw chiller
- Sensible heat recovery from exhaust air and solar hot water collector
- Energy-Saving Light Bulbs

**Water – 42% Savings through:**
- Low-Flow showerhead and faucet
- Dual Flush Water Closets in all guest rooms
- rainwater harvesting system
- grey water treatment and recycling system.

**Materials – 34% Savings through:**
- Solid dense concrete blocks for internal and external walls
- laminated wooden flooring
- timber window frames

### PROJECT METRICS

- **Incremental Cost:** $221,930
- **Utility Cost Savings:** $8,725/month
- **Payback in Years:** 2.1
- **Operational CO₂ Savings:** 1,700 tCO₂/Year

*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/)
SHOPPING CENTERS – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

Energy Measures – 24% Savings through:
- Insulation of Roof and External Wall
- Variable Refrigeration Flow Cooling System
- Air Conditioning with Air Cooled Screw Chiller

Water – 31% Savings through:
- Dual Flush for Water Closets
- Aerator and Auto Shut-off Faucet

Materials – 24% Savings through:
- Concrete Hollow Filler Slab

RELEVANT CERTIFIED PROJECT

Energy Measures – 29% Savings through:
- Reduced Window to Wall Ratio, Reflective Paint for Roof
- Variable Refrigerant Volume (VRV) Cooling System
- Energy Saving Lighting, Solar Photovoltaics

Water – 49% Savings through:
- Low-Flow Plumbing Fixtures
- Aerators and Auto Shut-off Faucet in All Washrooms
- Rainwater Harvesting System

Materials – 36% Savings through:
- In-Situ Reinforced Concrete Floor Slabs, Steel Sheets on Steel Rafters Roof
- Steel Profile Cladding for External Walls; Autoclaved Aerated Concrete for Internal and External Walls

PROJECT METRICS

Incremental Cost $156,300
Utility Cost Savings $7,000/month
Payback in Years 1.9
Operational CO₂ Savings 1370 tCO₂/Year

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
OFFICES – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 33% Savings through:
- Variable Refrigerant Flow System
- Air Conditioning with Water Screwed Chiller
- Energy Saving Lightbulb

Water – 20% Savings through:
- Water-efficient bathroom urinals
- Dual flush for water closets in bathrooms
- Low Flow Faucet in bathroom
- Water Efficient Faucet in Kitchen

Materials – 27% Savings through:
- Concrete Filler Floor Slabs

PROJECT METRICS

- Incremental Cost: $57,100
- Utility Cost Savings: $1,330/month
- Payback in Years: 3.6
- Operational CO₂ Savings: 180 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 38% Savings through:
- Reduced Window to Wall Ratio
- Reflective paint for roof and walls
- Roof and wall insulation
- Energy-Saving Light Bulbs for Internal and External Spaces

Water – 23% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- Rainwater Harvesting System

Materials – 63% Savings through:
- Reuse of existing floor slabs and external walls with steel profile cladding
- Plasterboards on metal studs for internal walls,
- Steel sheets on steel rafters for the roof, and ceramic tile.

Centro de Desarrollo Emprendedor y Laboral (CeDEL)

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SCHOOLS – ARGENTINA CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Energy Measures – 21% Savings through:
- Reduce Window to Wall Ratio
- External Shading Device
- Natural Ventilation for Corridors

Water – 30% Savings through:
- Low Flow Faucet
- Water-Efficient Urinals
- Duel Flush Water Closet
- Water Efficient Faucet for Kitchen Sink

Materials – 23% Savings through:
- Concrete Filler Floor Slabs

PROJECTED PROJECT METRICS

Incremental Cost
$17,740

Utility Cost Savings
$200/month

Payback in Years
7.5 Years

Operational CO2 Savings
72 tCO₂/Year

21.4% Meets EDGE Energy Standard

PROJECTED PROJECT METRICS

Incremental Cost
$17,740

Utility Cost Savings
$200/month

Payback in Years
7.5 Years

Operational CO2 Savings
72 tCO₂/Year

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

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
HOSPITALS – ARGENTINA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

Energy Measures – 32% Savings through:
- Variable Refrigerant Flow Cooling Systems
- Energy Saving Light Bulbs - Internal & External Spaces
- Insulation of Roof and External Wall
- Air Conditioning with Air and Water Screwed Chiller

Water – 37% Savings through:
- Low Flow Faucet in Bathroom
- Duel Flush for Water Closet in all Bathrooms
- Water Efficient Urinals and Faucet in Kitchen

Materials – 27% Savings through:
- In-Situ Trough Concrete Floor Slabs

PROJECT METRICS

Incremental Cost
$452,580

Utility Cost Savings
$5,820/month

Payback in Years
6.5

Operational CO₂ Savings
1240 tCO₂/Year

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

Sede de EBAIS de Escobal de Belén (COSTA RICA)

In-country certified project to replace related example once an EDGE project is certified.
LIGHT INDUSTRY—ARGENTINA CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts in a day (8 hour, 6 workday)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

**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

25.25% Meets EDGE energy standard

PROJECTED PROJECT METRICS

Incremental Cost
$70,440

Utility Cost Savings
$2,470

Payback in Years
2.4 Years

Operational CO2 Savings
143 tCO₂/Year

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BRAZIL: GREEN BUILDINGS RETURN ON INVESTMENT
BRAZIL – ROI ON MEASURES NEEDED TO ACHIEVE THE EDGE STANDARD

<table>
<thead>
<tr>
<th>Category</th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>$840/Unit</td>
<td>$12 / Unit</td>
<td>5.9</td>
</tr>
<tr>
<td>Hotels</td>
<td>$180,500</td>
<td>$11,735</td>
<td>1.3</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>$443,000</td>
<td>$12,700</td>
<td>2.9</td>
</tr>
<tr>
<td>Offices</td>
<td>$50,900</td>
<td>$1,870</td>
<td>2.3</td>
</tr>
<tr>
<td>Schools</td>
<td>$46,375</td>
<td>$635</td>
<td>6</td>
</tr>
<tr>
<td>Hospitals</td>
<td>$119,000</td>
<td>$8,075</td>
<td>1.3</td>
</tr>
<tr>
<td>Light Industry</td>
<td>$350,470</td>
<td>$5,730</td>
<td>5.1</td>
</tr>
</tbody>
</table>
HOMES – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 25% Savings through:
- External Shading Device
- Reduce Window to Wall Ratio
- Energy Saving Light Bulbs
- Ceiling Fans in all Habitable Rooms

Water – 24% Savings through:
- Low-Flow Showerheads
- Low-Flow Faucets for Washbasins & Kitchen Sinks
- Dual Flush for Water Closets

Materials – 28% Savings through:
- Pre-Cast Concrete Panel for External Wall
- Composite Slim Slabs with Steel I-Beam Floor

PROJECT METRICS

Incremental Cost
$840/unit

Utility Cost Savings
$12/month/unit

Payback in Years
5.9

Operational CO₂ Savings
1.85 tCO₂/Year/unit

RELEVANT CERTIFIED PROJECT

Energy Measures – 23% Savings through:
- Reduced Window To Wall Ratio
- Energy-saving Lighting And Lighting Controls For Common Areas And Outdoor Spaces.

Water – 23% Savings through:
- Low-Flow Showerheads
- Low-Flow Faucets
- Dual Flush Water Closet

Materials – 57% Savings through:
- In-situ Reinforced Concrete For Floors And Roofs
- Medium Weight Hollow Concrete Blocks For Internal And External Walls.

JULIO PRESTES (BRAZIL)

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HOTELS – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

Energy Measures – 23% Savings through:
- External Shading Device
- Air Conditioning Water Cooled Chiller
- Energy Saving Light Bulb

Water – 21% Savings through:
- Low-Flow Showerheads and Faucets Guestrooms
- Water Efficient Urinal
- Aerator and Auto Shut-off Faucet in non-guest area
- Duel Flush Water Closet

Materials – 28% Savings through:
- In-Situ Concrete with >25% GGBS Flooring

PROJECT METRICS

Incremental Cost $180,500

Utility Cost Savings $11,735/month

Payback in Years 1.3

Operational CO₂ Savings 1650 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:
- Reduced Window To Wall Ratio, Low-e Coated Glass
- Reflective Paint For External Walls
- Insulation Of Roof And External Walls
- Natural Ventilation For Corridors
- Energy-saving Lighting Systems
- Occupancy Sensors In Bathrooms
- Solar Photovoltaics.

Water – 35% Savings through:
- Low-flow Faucets In Kitchens And Bathrooms
- Single-flush And Flush Valve For Water Closets
- Water-efficient Urinals, Faucets And Landscaping
- Rainwater Harvesting System.

Materials – 43% Savings through:
- Steel Sheets On Steel Rafters For Roof Construction
- Medium Weight Hollow Concrete Blocks For Internal And External Walls
- Finished Concrete Flooring.

THE 101 YOGYAKARTA TUGU (INDONESIA)

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

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

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

Energy Measures – 37% Savings through:
- Insulation of Roof
- Air Conditioning with Air Cooled Screw Chiller
- Solar Photovoltaics Replacing 25% of energy

Water – 42% Savings through:
- Dual Flush for Water Closets
- Water Efficient Urinals
- Aerator and Auto Shut-off Faucet

Materials – 39% Savings through:
- In-Situ Concrete with >25% GGBS for Floor and Roof

PROJECT METRICS

- Incremental Cost: $443,000
- Utility Cost Savings: $12,700/month
- Payback in Years: 2.9
- Operational CO₂ Savings: 785 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 29% Savings through:
- Reduced Window to Wall Ratio, Reflective Paint for Roof
- Insulation of roof and external walls
- Variable refrigerant volume cooling system
- Energy-saving lighting system for external spaces, sales, corridors, common areas skylights.

Water – 27% Savings through:
- Low-flow faucets in kitchens and bathrooms
- Dual-flush water closets, water-efficient urinals
- Aerators and auto shut-off faucets in all bathrooms.

Materials – 36% Savings through:
- Steel sheets on steel rafters for roof construction
- Medium weight hollow concrete blocks and steel profile cladding for external walls
- Medium weight hollow concrete blocks for internal walls
- Finished concrete floor.

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
OFFICES – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 24% Savings through:
- Air Conditioning With Water Cooled Chiller
- Variable Refrigerant Flow Cooling System

Water – 22% Savings through:
- Grey Water Treatment and Recycle System
- Rainwater Harvesting System on 50% of Roof Area
- Water-Efficient Bathroom Urinals and Faucets for Kitchen Sinks
- Dual Flush for Water Closets in Bathrooms
- Low Flow Water Faucet in Bathroom

Materials – 35% Savings through:
- In-Situ Concrete with >25% GGBS Floor Slabs

PROJECT METRICS

Incremental Cost $50,900

Utility Cost Savings $1,870/month

Payback in Years 2.3

Operational CO₂ Savings 230 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:
- Reduced window to wall ratio
- Reflective paint and tiles for roof and external walls
- External shading devices
- Insulation of roof
- Energy-saving lighting system for internal spaces.

Water – 24% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Dual-flush water closets

Materials – 43% Savings through:
- Aluminum-clad sandwich panel for roof construction
- In-situ reinforced wall and honeycomb clay blocks with internal and external plaster for external walls
- Honeycomb clay blocks with plaster on both sides and plasterboards on metal studs for internal walls
- Ceramic tile flooring
- Aluminium window frames.

ALTURIA (COLOMBIA)

In-country certified project to replace related example once an EDGE project is certified.
SCHOOLS – BRAZIL CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Energy Measures – 28% Savings through:
- Variable Refrigeration Flow Cooling System
- Air Conditioning with Air or Water Chiller
- Insulation of Roof and External Wall

Water – 22% Savings through:
- Dual Flush Water Closet
- Low Flow Faucet
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

Materials – 20% Savings through:
- Composite Slim Slab with Steel I-Beam Floor

PROJECTED PROJECT METRICS

Incremental Cost
$46,375

Utility Cost Savings
$635/month

Payback in Years
6 Years

Operational CO2 Savings
97 tCO₂/Year

27.7% Meets EDGE Energy Standard

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
HOSPITALS – BRAZIL CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

Energy Measures – 26% Savings through:
- Variable Refrigerant Flow Cooling Systems
- Energy Saving Light Bulbs - Internal & External Spaces
- Air Conditioning with Air or Water Chiller
- Sensible Heat Recovery from Exhausted Air

Water – 32% Savings through:
- Low Flow Faucet in all Bathroom
- Dual Flush Water Closet
- Water Efficient Urinal and Kitchen Faucet

Materials – 25% Savings through:
- Concrete Filler Floor Slabs

PROJECT METRICS

Incremental Cost $119,000
Utility Cost Savings $8,075/month
Payback in Years 1.3
Operational CO₂ Savings 1210 tCO₂/Year

RELEVANT CERTIFIED PROJECT

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

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/
LIGHT INDUSTRY—BRAZIL CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts in a day (8 hour, 6 workday)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

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

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
COLOMBIA: GREEN BUILDINGS RETURN ON INVESTMENT
<table>
<thead>
<tr>
<th>Building Type</th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>$630/Unit</td>
<td>$20/Unit</td>
<td>2.9</td>
</tr>
<tr>
<td>Hotels</td>
<td>$159,900</td>
<td>$7,900</td>
<td>1.7</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>$201,300</td>
<td>$8,735</td>
<td>1.9</td>
</tr>
<tr>
<td>Offices</td>
<td>$29,880</td>
<td>$830</td>
<td>3</td>
</tr>
<tr>
<td>Schools</td>
<td>$20,700</td>
<td>$225</td>
<td>8</td>
</tr>
<tr>
<td>Hospitals</td>
<td>$256,700</td>
<td>$8,420</td>
<td>2.5</td>
</tr>
<tr>
<td>Light Industry</td>
<td>$78,340</td>
<td>$2,320</td>
<td>2.8</td>
</tr>
</tbody>
</table>
HOMES – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 21% Savings through:
- Low-E Coated Glass
- Energy Saving Light Bulbs in All Areas
- Natural Ventilation
- Ceiling Fans in all Habitable Rooms
- Energy Efficient Refrigerators and Clothes Washing Machines

Water – 24% Savings through:
- Low-Flow Showerheads
- Low-Flow Faucets for Washbasins & Kitchen Sinks
- Dual Flush for Water Closets

Materials – 35% Savings through:
- Concrete Filler Floor Slab

PROJECT METRICS

Incremental Cost
- $630/unit

Utility Cost Savings
- $18/month/unit

Payback in Years
- 2.9

Operational CO₂ Savings
- 2.3 tCO₂/Year/unit

RELEVANT CERTIFIED PROJECT

Energy Measures – 28% Savings through:
- Reduced Window to Wall Ratio
- external shading devices
- energy-saving lighting system for internal spaces, common areas and external spaces
- lighting controls for common areas and outdoors.

Water – 52% Savings through:
- Low-Flow Faucets in Kitchen and Bathroom
- Dual-flush Water Closets

Materials – 47% Savings through:
- In-situ trough concrete slab for floor slabs and roof construction
- exposed cored bricks with internal plaster for external walls
- honeycomb clay blocks with plaster on both sides for internal walls.

EDIFICIO BIEL (COLOMBIA)

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
HOTELS – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

Energy Measures – 23% Savings through:
- External Shading Device
- Variable Refrigerator Flow Cooling System
- Air Conditioning with Water Cooled Chiller
- Energy Saving Light Bulbs for Internal Space

Water – 20% Savings through:
- Low-Flow Showerheads and Faucets Guestrooms
- Dual Flush Water Closet
- Water Efficient Urinal

Materials – 33% Savings through:
- Concrete Filler Floor Slabs

PROJECT METRICS
Incremental Cost
$159,900
Utility Cost Savings
$7,900/month
Payback in Years
1.7
Operational CO₂ Savings
763 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 23% Savings through:
- Reduced Window To Wall Ratio, Low-e Coated Glass
- Air Conditioning With Air Cooled Screw Chiller
- Low-e Coated Glass, Variable Speed Drives On The Fans Of Cooling Towers
- Variable Speed Drives Pumps,

Water – 28% Savings through:
- Black Water Treatment And Recycling System.
- Dual Flush Water Closets In All Bathrooms

Materials – 51% Savings through:
- 150mm In-situ Reinforced Concrete Slab For Floors And Roof
- 200mm Solid Dense Concrete Blocks For Internal And External Walls
- And Laminated Wooden Flooring.

SAMHI – FAIRFIELD BY MARRIOTT (INDIA)
In-country certified project to replace related example once an EDGE project is certified.

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
SHOPPING CENTERS – COLOMBIA CASE STUDY & CERTIFIED PROJECT

**BUILDING DETAILS**

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

Energy Measures – 29% Savings through:

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

Water – 35% Savings through:

- Dual Flush for Water Closets
- Water Efficient Urinal
- Aerator and Auto Shut-off Faucet

Materials – 24% Savings through:

- Concrete Filler Roof Slab

**PROJECT METRICS**

- Incremental Cost: $201,300
- Utility Cost Savings: $8,735/month
- Payback in Years: 1.9
- Operational CO₂ Savings: 655 tCO₂/Year

**RELEVANT CERTIFIED PROJECT**

Energy Measures – 58% Savings through:

- Reduced Window To Wall Ratio and Insulation of Roof and Walls
- Energy-efficient VRV Cooling System
- Variable Frequency Drives In Air Handling Units
- Sensible Heat Recovery From Exhaust Air
- CO₂ Sensor/Demand Controlled Ventilation For Fresh Air Intake
- Energy-saving Lighting and Occupancy Sensors In Bathrooms.

Water – 41% Savings through:

- Dual flush for water closets
- water-efficient urinals and kitchen faucets.
- aerators and auto-shut-off faucets in all bathrooms
- Materials – 44% Savings through:

- Hollow core precast slab for floors
- steel-clad sandwich panel for roof construction, autoclaved aerated concrete blocks for external walls
- autoclaved aerated concrete blocks and plasterboards on metal studs with insulation for internal walls, and finished concrete flooring.

**VILNIUS FABIJONISKES BY LIDL (LITHUANIA)**

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/](https://www.edgebuildings.com/projects/)
OFFICES – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 21% Savings through:
- Air Conditioning with Water Chiller
- Variable Refrigerant Flow Cooling System
- Occupancy Sensor

Water – 35% Savings through:
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms
- Low Flow Bathroom Faucet

Materials – 22% Savings through:
- In-Situ Concrete with > 25% GGBS Floor Slabs

PROJECT METRICS

Incremental Cost
$29,880

Utility Cost Savings
$830/month

Payback in Years
3

Operational CO₂ Savings
88.5 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:
- Reduced window to wall ratio
- Reflective paint and tiles for roof and external walls
- External shading devices
- Insulation of roof
- Energy-saving lighting system for internal spaces.

Water – 24% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Dual-flush water closets

Materials – 43% Savings through:
- Aluminum-clad sandwich panel for roof construction
- In-situ reinforced wall and honeycomb clay blocks with internal and external plaster for external walls
- Honeycomb clay blocks with plaster on both sides and plasterboards on metal studs for internal walls
- Ceramic tile flooring
- Aluminium window frames.

ALTURIA (COLOMBIA)

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
SCHOOLS – COLOMBIA CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Energy Measures – 22% Savings through:
- Low-E Coated Glass
- Energy Efficient Ceiling Fan
- Insulation of Roof

Water – 31% Savings through:
- Low Flow Faucet and Showerhead
- Dual Flush Water Closet
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

Materials – 20% Savings through:
- Composite Slim Slab with Steel I-Beam Floor Slab

PROJECTED PROJECT METRICS

Incremental Cost
$20,700

Utility Cost Savings
$225/month

Payback in Years
8 Years

Operational CO2 Savings
25 tCO₂/Year

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

Education is a new sector in the EDGE application. Relevant certified project to be included as soon as case study is published.
HOSPITALS – COLOMBIA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

Energy Measures – 30% Savings through:
- Variable Refrigerant Flow Cooling Systems
- Air Conditioning with Air or Water Chiller
- Insulation of Roof and External Wall

Water – 32% Savings through:
- Low Flow Showerhead and Faucet
- Water-Efficient Urinals and Kitchen Faucet

Materials – 38% Savings through:
- Concrete Filler Floor Slabs

RELEVANT CERTIFIED PROJECT – LEBANON

Energy Measures – 21% Savings through:
- Reduced Window To Wall Ratio
- Insulation Of Roof And External Walls And Higher Thermal Performance Glass
- Air Economizers
- Energy-efficient Air Conditioning With Air-cooled Chiller, Variable Frequency Drives In Air Handling Units, 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

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

KESERWAN MEDICAL CENTER (LEBANON)
LIGHT INDUSTRY – COLOMBIA CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts (8 hour, 6 work day)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

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

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
COSTA RICA: GREEN BUILDINGS RETURN ON INVESTMENT
## COSTA RICA – ROI ON MEASURES NEEDED TO ACHIEVE THE EDGE STANDARD

<table>
<thead>
<tr>
<th></th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>114,000 CRC/Unit</td>
<td>12,230 CRC/Unit</td>
<td>0.6</td>
</tr>
<tr>
<td>Hotels</td>
<td>73,050,000 CRC</td>
<td>5,728,000 CRC</td>
<td>1.1</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>117,564,000 CRC</td>
<td>7,555,700 CRC</td>
<td>1.3</td>
</tr>
<tr>
<td>Offices</td>
<td>15,500,000 CRC</td>
<td>1,125,000 CRC</td>
<td>1.2</td>
</tr>
<tr>
<td>Schools</td>
<td>16,882,000 CRC</td>
<td>412,700 CRC</td>
<td>3.4</td>
</tr>
<tr>
<td>Hospitals</td>
<td>196,186,000 CRC</td>
<td>6,744,000 CRC</td>
<td>2.4</td>
</tr>
<tr>
<td>Light Industry</td>
<td>254,433,000 CRC</td>
<td>7,000,000 CRC</td>
<td>3</td>
</tr>
</tbody>
</table>
HOMES – COSTA RICA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 25% Savings through:
- Energy Saving Light Bulbs
- External Shading Device
- Insulation of Roof

Water – 22% Savings through:
- Low-Flow Showerheads
- Low-Flow Faucets for Washbasins & Kitchen Sinks
- Dual Flush for Water Closets

Materials – 30% Savings through:
- Hollow Concrete Precast Floor Slabs

RELEVANT CERTIFIED PROJECT

Energy Measures – 54% Savings through:
- Reduced Window to Wall Ratio
- natural ventilation
- energy-saving lighting

Water – 27% Savings through:
- Low-Flow Faucet for kitchen sinks and washbasins
- Low-Flow Flush for Water Closet

Materials – 55% Savings through:
- Concrete beam vault with insulation
- corrugated zinc sheets for roof
- medium weight hollow concrete blocks for internal and external walls
- finished concrete floor

PROJECT METRICS

Incremental Cost
114,000 CRC/unit

Utility Cost Savings
12,230 CRC/month/unit

Payback in Years
0.6

Operational CO₂ Savings
0.75 tCO₂/Year/unit

CONDOMINIO LINDA VISTA EL MIRADOR (COSTA RICA)

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
HOTELS – COSTA RICA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

Energy Measures – 20% Savings through:
- External Shading Device
- Energy Saving Lightbulb in Internal and External Area

Water – 37% Savings through:
- Low-Flow Showerheads and Faucets Guestrooms
- Duel Flush Water Closet
- Water Efficient Washing Machine and Urinal

Materials – 22% Savings through:
- Hollow Core Precast Slab Flooring
- Hollow Concrete Internal Wall Block

PROJECT METRICS

Incremental Cost
73,050,000 CRC

Utility Cost Savings
5,728,000 CRC/month

Payback in Years
1.1

Operational CO₂ Savings
270 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 60% Savings through:
- Reduced Window to Wall Ratio, external shading devices
- variable refrigerant volume cooling system
- heat pump for hot water
- energy-saving lighting in internal and external areas
- solar photovoltaics.

Water – 26% Savings through:
- Low-flow showerheads
- low-flow faucets in guest rooms
- dual flush water closets in all bathrooms
- water-efficient kitchen faucets

Materials – 34% Savings through:
- Cored bricks with internal and external plaster for internal and external walls
- parquet wood flooring.

Eco Green Boutique Hotel (Vietnam)
In-country certified project to replace related example once an EDGE project is certified.
BUILDING DETAILS

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

Energy Measures – 23% Savings through:
- Insulation of Roof and External Wall
- Air Conditioning with Air Cooled Chiller
- Energy Saving Light Bulbs, Sales Area

Water – 25% Savings through:
- Dual Flush for Water Closets
- Water Efficient Urinals
- Aerator and Auto Shut-off Faucet

Materials – 25% Savings through:
- In-situ Trough Concrete Floor Slab

PROJECT METRICS

Incremental Cost
117,564,000 CRC

Utility Cost Savings
7,555,700 CRC/month

Payback in Years
1.3

Operational CO₂ Savings
400 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 29% Savings through:
- Reduced Window to Wall Ratio, Reflective Paint for Roof
- Variable Refrigerant Volume (VRV) Cooling System
- Energy Saving Lighting, Solar Photovoltaics

Water – 49% Savings through:
- Low-Flow Plumbing Fixtures
- Aerator and Auto Shut-off Faucet in All Washrooms
- Rainwater Harvesting System

Materials – 36% Savings through:
- In-Situ Reinforced Concrete Floor Slabs, Steel Sheets on Steel Rafters Roof
- Steel Profile Cladding for External Walls; Autoclaved Aerated Concrete for Internal and External Walls

RETAIL AT SANTA VERDE (COSTA RICA)

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
OFFICES – COSTA RICA CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 25% Savings through:
- Energy Saving Light Bulbs for Internal Space
- Natural Ventilation with Operable Window
- Air Conditioning: COP of 3.5*

Water – 47% Savings through:
- Grey Water Treatment and Recycling System
- Rainwater Harvesting System 50% of Roof Area
- Water-efficient Urinals and Kitchen Faucet
- Dual flush for water closets in bathrooms
- Low Flow Faucet in Bathroom

Materials – 20% Savings through:
- Hollow Core Precast Floor Slabs
- Finished Concrete Flooring

RELEVANT CERTIFIED PROJECT

Energy Measures – 22% Savings through:
- Reduced Window To Wall Ratio
- Energy-saving Lighting Systems In Internal And External Areas
- Occupancy Sensors In Bathrooms, Conference Rooms And Offices

Water – 27% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets

Materials – 27% Savings through:
- Steel Sheets On Steel Rafters For Roof Construction
- Cement Fiber Boards On Metal Studs For External Walls
- Finished Concrete Flooring

PROJECT METRICS

Incremental Cost
15,500,000 CRC

Utility Cost Savings
1,125,000 CRC/month

Payback in Years
1.2

Operational CO₂ Savings
70 tCO₂/Year

*NOT PART OF ENERGY SAVING
Assumed Air Conditioning Installation in the Future

*NOT PART OF ENERGY SAVING
Assumed Air Conditioning Installation in the Future

Offices At Santa Verde (Costa Rica)

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
SCHOOLS – COSTA RICA CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Energy Measures – 25% Savings through:
- Variable Refrigerant Flow Cooling System
- Insulation of Roof and External Wall

Water – 31% Savings through:
- Dual Flush
- Low Flow Faucet in
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

Materials – 20% Savings through:
- Composite Slim Slabs with I-Beam Floor

PROJECTED PROJECT METRICS

Incremental Cost
16,882,000 CRC

Utility Cost Savings
412,700 CRC/month

Payback in Years
3.4 Years

Operational CO2 Savings
30 tCO₂/Year

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

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
HOSPITALS – COSTA RICA CASE STUDY & CERTIFIED PROJECT

**BUILDING DETAILS**

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

- **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 (exclude OT)

- **Water** – 22% Savings through:
  - Low Flow Showerheads and Faucets
  - Dual Flush Water Closet
  - Water-Efficient Urinals

- **Materials** – 25% Savings through:
  - Concrete Filler Floor Slab

**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**: 196,186,000 CRC
- **Utility Cost Savings**: 6,744,000 CRC/month
- **Payback in Years**: 2.4
- **Operational CO₂ Savings**: 490 tCO₂/Year

---

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/](https://www.edgebuildings.com/projects/)
BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts (8 hour, 6 work day)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

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

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
MEXICO: GREEN BUILDINGS RETURN ON INVESTMENT

Creating Markets, Creating Opportunities
## MEXICO – ROI ON MEASURES NEEDED TO ACHIEVE THE EDGE STANDARD

<table>
<thead>
<tr>
<th></th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>$345/Unit</td>
<td>$15/Unit</td>
<td>2</td>
</tr>
<tr>
<td>Hotels</td>
<td>$227,700</td>
<td>$7,430</td>
<td>3.1</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>$132,700</td>
<td>$8,230</td>
<td>1.4</td>
</tr>
<tr>
<td>Offices</td>
<td>$52,420</td>
<td>$1,250</td>
<td>3.5</td>
</tr>
<tr>
<td>Schools</td>
<td>$25,200</td>
<td>$290</td>
<td>7.2</td>
</tr>
<tr>
<td>Hospitals</td>
<td>$300,970</td>
<td>$5,430</td>
<td>4.6</td>
</tr>
<tr>
<td>Light Industry</td>
<td>$117,490</td>
<td>$6,170</td>
<td>1.6</td>
</tr>
</tbody>
</table>
HOMES – MEXICO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 26% Savings through:
- Reduced Window to Wall Ratio
- Energy Saving Light Bulbs
- Natural Ventilation

Water – 27% Savings through:
- Recycled Grey Water for Flushing
- Low-Flow Showerheads
- Low-Flow Faucets for Washbasins & Kitchen Sinks
- Dual Flush for Water Closets

Materials – 21% Savings through:
- Concrete Filler Floor Slabs

PROJECT METRICS

Incremental Cost
$345/unit

Utility Cost Savings
$14/month/unit

Payback in Years
2

Operational CO₂ Savings
2.6 tCO₂/Year/unit

ACALLI (MEXICO)

RELEVANT CERTIFIED PROJECT

Energy Measures – 35% Savings through:
- Reduced Window To Wall Ratio
- Energy-saving Lighting Systems For Internal Spaces, Common Areas And External Spaces

Water – 22% Savings through:
- Low-flow Faucets In Kitchens And Bathrooms
- Dual-flush Water Closets

Materials – 30% Savings through:
- Concrete Filler Slab With Polystyrene Blocks For Floor Slabs And Roof Construction
- Honeycomb Clay Blocks With Plaster On Both Sides For Internal And External Walls

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
**Building Details**

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

Energy Measures – 21% Savings through:
- High Thermal Performance Glass
- Energy Saving Light Bulbs
- Preheat Water Using Waste Heat from the Generator

Water – 21% Savings through:
- Dual Flush for Water Closet
- Low Flow Faucet and Showerhead in Guest Rooms
- Aerator and Auto Shut-off Faucet in Other Restroom
- Water Efficient Dishwasher

Materials – 28% Savings through:
- Concrete Filler Slab with Polystyrene Flooring

**Project Metrics**

- Incremental Cost: $227,700
- Utility Cost Savings: $7,430/month
- Payback in Years: 3.1
- Operational CO₂ Savings: 1645 tCO₂/Year

**Relevant Certified Project**

Energy Measures – 23% Savings through:
- Reduced Window to Wall Ratio, Low-E Coated Glass
- Air Conditioning with Air Cooled Screw Chiller
- Energy Saving Lighting for back-of-house, internal, external spaces

Water – 28% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Single Flush and Flush Valve for Water Closets
- Water-Efficient Urinals
- Aerators and Auto Shut-off Faucet in Bathrooms

Materials – 51% Savings through:
- Facing Brick and Hollow Concrete Blocks for External Walls

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
BUILDING DETAILS

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

Energy Measures – 24% Savings through:
- Insulation of Roof and External Wall
- Air Conditioning with Air Cooled Screw Chiller
- Variable Refrigerant Flow Cooling System

Water – 37% Savings through:
- Dual Flush for Water Closets
- Water Efficient Urinals
- Aerators and Auto Shut-off Faucet

Materials – 24% Savings through:
- Concrete Filler Floor Slabs

PROJECT METRICS

Incremental Cost: $132,700
Utility Cost Savings: $8,230/month
Payback in Years: 1.4
Operational CO₂ Savings: 1275 tCO₂/Year

RELEVANT CERTIFIED PROJECT

Energy Measures – 29% Savings through:
- Reduced Window to Wall Ratio, Reflective Paint for Roof
- Variable Refrigerant Volume (VRV) Cooling System
- Energy Saving Lighting, Solar Photovoltaics

Water – 49% Savings through:
- Low-Flow Plumbing Fixtures
- Aerators and Auto Shut-off Faucet in All Washrooms
- Rainwater Harvesting System

Materials – 36% Savings through:
- In-Situ Reinforced Concrete Floor Slabs, Steel Sheets on Steel Rafters Roof
- Steel Profile Cladding for External Walls; Autoclaved Aerated Concrete for Internal and External Walls

RETAIL AT SANTA VERDE (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/
**BUILDING DETAILS**

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 31% Savings through:
- Air Conditioning with Air Cooled Screw
- Energy Saving Light Bulbs
- Variable Refrigerant Flow Cooling System

Water – 21% Savings through:
- Dual flush for water closets in bathrooms
- Low Flow Faucet
- Water-efficient urinals and faucets for kitchen sinks

Materials – 22% Savings through:
- In-Situ Concrete with > 25% GGBS Floor Slabs

**RELEVANT CERTIFIED PROJECT**

Energy Measures – 33% Savings through:
- Reduced Window To Wall Ratio
- Reflective Paint For Roof And External Walls And Low-e Coated Glass
- Air Conditioning With Water-cooled Chiller
- Variable Frequency Drives In AHUs and Pumps With Variable Speed Drives
- Occupancy Sensors
- Energy-saving Light Bulbs For Internal And External Spaces

Water – 38% Savings through:
- Low-flow Plumbing Fixtures For Washbasins And Kitchens
- Rainwater Harvesting System

Materials – 21% Savings through:
- Hollow-core Precast Floor Slabs, Steel Sheets For Roof
- Polymeric Render On Concrete Blocks For External Walls
- Plasterboards On Metal Studs With Insulation For Internal Walls And Flooring
- Nylon Carpets; And Finished Concrete Flooring

**PROJECT METRICS**

Incremental Cost: $52,420
Utility Cost Savings: $1,250/month
Payback in Years: 3.5
Operational CO₂ Savings: 160 tCO₂/Year

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
SCHOOLS – MEXICO CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

Energy Measures – 24% Savings through:
- Reduced Window to Wall Ratio
- Insulation of Roof and External Wall
- Natural Ventilation for Classroom

Water – 31% Savings through:
- Dual Flush
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

Materials – 29% Savings through:
- Concrete Filler Floor Slabs

PROJECTED PROJECT METRICS

Incremental Cost
$25,200

Utility Cost Savings
$290/month

Payback in Years
7.2 Years

Operational CO2 Savings
60 tCO2/Year

24.4% Meets EDGE Energy Standard

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
HOSPITALS – MEXICO CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

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

PROJECT METRICS

Incremental Cost
$300,970

Utility Cost Savings
$5,430/month

Payback in Years
4.6

Operational CO₂ Savings
1250 tCO₂/Year

Sede de EBAIS de Escobal de Belén (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/
LIGHT INDUSTRY– MEXICO CASE STUDY

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts (8 hour, 6 work day)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

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

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

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
PERU: GREEN BUILDINGS RETURN ON INVESTMENT

Creating Markets, Creating Opportunities
# Peru – ROI on Measures Needed to Achieve the Edge Standard

<table>
<thead>
<tr>
<th></th>
<th>Incremental Cost</th>
<th>Utility Savings / month</th>
<th>Payback Period in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>865 S/Unit</td>
<td>55 S/Unit</td>
<td>1.3</td>
</tr>
<tr>
<td>Hotels</td>
<td>175,700 S</td>
<td>46,300 S</td>
<td>0.3</td>
</tr>
<tr>
<td>Shopping Centers</td>
<td>1,468,700 S</td>
<td>24,600 S</td>
<td>5</td>
</tr>
<tr>
<td>Offices</td>
<td>68,200 S</td>
<td>6,600 S</td>
<td>1</td>
</tr>
<tr>
<td>Schools</td>
<td>95,500 S</td>
<td>2,660 S</td>
<td>3</td>
</tr>
<tr>
<td>Hospitals</td>
<td>878,900 S</td>
<td>31,900 S</td>
<td>2.3</td>
</tr>
<tr>
<td>Light Industry</td>
<td>1,414,000 S</td>
<td>43,250 S</td>
<td>2.5</td>
</tr>
</tbody>
</table>
**HOMES – PERU CASE STUDY & CERTIFIED PROJECT**

**BUILDING DETAILS**

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Average Unit Area</th>
<th>Bedrooms / Unit</th>
<th>Floors</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income</td>
<td>80m²</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

Energy Measures – 26% Savings through:
- Insulation of Roof
- Energy Saving Light Bulbs, Internal and Common Area
- Natural Ventilation

Water – 24% Savings through:
- Low-Flow Showerheads
- Low-Flow Faucets for Kitchen Sinks
- Dual Flush for Water Closets

Materials – 20% Savings through:
- Concrete Filler Floor Slabs

---

**RELEVANT CERTIFIED PROJECT**

Energy Measures – 32% Savings through:
- Reduced Window To Wall Ratio
- Insulation Of Roof And External Walls

Water – 36% Savings through:
- Low-flow Faucets In Kitchens And Bathrooms
- Dual-flush Water Closets

Materials – 41% Savings through:
- Concrete Filler Slab For Floor Slabs And Roof Construction
- In-situ Reinforced Wall And Cored Bricks With Internal And External Plaster For External Walls
- Cored Bricks With Plaster On Both Sides For Internal Walls
- Laminated Wooden Flooring And Ceramic Tile

**PROJECT METRICS**

- Incremental Cost: 865 S /unit
- Utility Cost Savings: 55 S/month/unit
- Payback in Years: 1.3
- Operational CO₂ Savings: 1.9 tCO₂/Year/unit

EDIFICIO MULTIFAMILIAR MARISCAL CASTILLA (PERU)

Case study for illustration purposes only, access more projects at [https://www.edgebuildings.com/projects/](https://www.edgebuildings.com/projects/)
HOTELS – PERU CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Hotel</th>
<th>Floors Above Ground</th>
<th>Total Guest Units</th>
<th>Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Star Hotel</td>
<td>8</td>
<td>200</td>
<td>15,599 m²</td>
</tr>
</tbody>
</table>

Energy Measures – 22% Savings through:
- Variable Refrigerant Flow Cooling System
- Air Conditioning with Air Chilled Screwed
- Energy Saving Light Bulbs Internal Space

Water – 21% Savings through:
- Low-Flow Showerheads and Faucets Guestrooms
- Water Efficient Urinals and Kitchen Faucet
- Aerator and Auto Shut-off Faucet in public restroom

Materials – 28% Savings through:
- In-Situ Concrete with > 25% GGBS Flooring

RELEVANT CERTIFIED PROJECT

Energy Measures – 51% Savings through:
- Reduced Window To Wall Ratio, Low-e Coated Glass
- Air Conditioning With Water Cooled Chiller
- External Shading Devices, Insulation Of Roof And External Walls
- Energy-efficient Lighting.

Water – 32% Savings through:
- Low-flow Showerheads
- Dual Flush Water Closets
- Water-efficient Urinals

Materials – 44% Savings through:
- Concrete Filler Slab For Floors And Roof
- Medium Weight Hollow Concrete Blocks For Internal Walls
- Finished Concrete Flooring And Upvc Window Frames.

PROJECT METRICS

Incremental Cost
175,700 $

Utility Cost Savings
46350 $/month

Payback in Years
0.3

Operational CO₂ Savings
2050 tCO₂/Year

Case study for illustration purposes only, access more projects at https://www.edgebuildings.com/projects/
**SHOPPING CENTERS – PERU CASE STUDY & CERTIFIED PROJECT**

### BUILDING DETAILS

<table>
<thead>
<tr>
<th>Site Area</th>
<th>Car Parking</th>
<th>Floors Above Ground</th>
<th>Amenities</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000 m²</td>
<td>Indoor Car Parking</td>
<td>1</td>
<td>Supermarket, Food Court</td>
</tr>
</tbody>
</table>

**Energy Measures – 21% Savings through:**
- Insulation of Roof and External Wall
- Variable Refrigerant Flow Cooling System
- Air Conditioning with Air Cooled Screw Chiller
- Energy Saving Light Bulbs, Sales Area

**Water – 24% Savings through:**
- Dual Flush for Water Closets
- Water Efficient Urinals
- Aerator and Auto Shut-off Faucet

**Materials – 23% Savings through:**
- Concrete Filler Floor Slabs

---

### PROJECT METRICS

- **Incremental Cost**: 1,468,700 S
- **Utility Cost Savings**: 24,600 S/month
- **Payback in Years**: 5
- **Operational CO₂ Savings**: 1050 tCO₂/Year

---

### RELEVANT CERTIFIED PROJECT

**Energy Measures – 37% Savings through:**
- Reduced Window To Wall Ratio
- Reflective Paint And Insulation For Roof And Walls
- Recovery Of Waste Heat From The Generator For Space Heating
- Variable Frequency Drives In Ahus, Variable Speed Drives Pumps
- CO₂ Sensor/Demand-controlled Ventilation For Fresh Air Intake
- High Efficiency Condensing Boiler For Space Heating
- High Efficiency Refrigerated Cases And Energy-efficient Lighting System

**Water – 53% Savings through:**
- Dual Flush Water Closets, Water-efficient Urinals
- Aerators And Auto Shut-off Faucet In All Washrooms

**Materials – 30% Savings through:**
- Corrugated Zinc Sheets For Roof Construction
- Steel Profile Cladding For External Walls And Solid Dense Concrete Blocks For Internal Walls

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**KAUFLAND – HRISTO SMIMENSKI (BULGARIA)**

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/](https://www.edgebuildings.com/projects/)
OFFICES – PERU CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Gross Internal Area</th>
<th>Floors Above Grade</th>
<th>Floors Below Grade</th>
<th>Floor-to-Floor Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000m²</td>
<td>3</td>
<td>2</td>
<td>3.5m</td>
</tr>
</tbody>
</table>

Energy Measures – 22% Savings through:
- Variable refrigerant flow system
- Air Conditioning with Air Cooled Screw Chiller

Water – 45% Savings through:
- Black Water Treatment and Recycling
- Water-efficient bathroom urinals and faucets for kitchen sinks
- Dual flush for water closets in bathrooms
- Low Flow Faucets in Bathroom

Materials – 35% Savings through:
- In-Situ Concrete with > 25% GGBS Floor Slabs

RELEVANT CERTIFIED PROJECT

Energy Measures – 32% Savings through:
- External shading, roof insulation
- Variable refrigerant volume cooling system
- Energy-saving lighting system
- Solar photovoltaics

Water – 54% Savings through:
- Low-Flow Faucets in Kitchens and Bathrooms
- Water-Efficient Urinals and Water Closets
- Dual flush water closets

Materials – 38% Savings through:
- Concrete Filler Slabs For Floors
- Solid Dense Concrete Blocks For External Walls

PROJECT METRICS

Incremental Cost
68,200 S

Utility Cost Savings
6,660 S/month

Payback in Years
1

Operational CO₂ Savings
280 tCO₂/Year

DIPOA (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/
**SCHOOLS – PERU CASE STUDY**

**BUILDING DETAILS**

<table>
<thead>
<tr>
<th>Occupancy Density</th>
<th>Operational Hours</th>
<th>Working Days</th>
<th>Holidays / Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>5</td>
<td>60</td>
</tr>
</tbody>
</table>

**Energy Measures** – 39% Savings through:
- External Shading Device
- Insulation of Roof and External Wall

**Water** – 23% Savings through:
- Dual Flush
- Water-Efficient Urinals
- Water-Efficient Faucets for Kitchen Sinks

**Materials** – 23% Savings through:
- Concrete Filler Floor Slabs

**PROJECTED PROJECT METRICS**

**Incremental Cost**
95,500 S

**Utility Cost Savings**
2,660 S/month

**Payback in Years**
3 Years

**Operational CO2 Savings**
60 tCO₂/Year

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

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Education is a new sector in the EDGE application. Relevant certified project to be included as soon as case study is published.
HOSPITALS – PERU CASE STUDY & CERTIFIED PROJECT

BUILDING DETAILS

<table>
<thead>
<tr>
<th>Type of Unit</th>
<th>Gross Internal Area</th>
<th>Occupancy Rate</th>
<th>Floors</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi Specialty</td>
<td>9,700m²</td>
<td>70%</td>
<td>7</td>
<td>100</td>
</tr>
</tbody>
</table>

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 through:
- Low Flow Showerhead and Faucet
- Dual Flush Water Closet
- Water Efficient Urinals

Materials – 20% Savings through:
- In-Situ Concrete with > 25% GGBS Floor Slabs

PROJECT METRICS

Incremental Cost
878,900 S

Utility Cost Savings
31,900 S/month

Payback in Years
2.3

Operational CO₂ Savings
1200 tCO₂/Year

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

Sede de EBAIS de Escobal de Belén (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/
BUILDING DETAILS

<table>
<thead>
<tr>
<th>Floors Above Ground</th>
<th>Shifts (8 hours, 6 work day)</th>
<th>Gross Internal Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15,000 m²</td>
</tr>
</tbody>
</table>

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

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

Creating Markets, Creating Opportunities
RESEARCH OBJECTIVE: MOST EFFECTIVE INTERVENTIONS TO REACH THE EDGE STANDARD

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

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

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

By utilizing EDGE, we sought the most effective interventions in the passive building design phase that would in turn lead to the lowest possible payback and lowest cost for investors and builders.
OVERVIEW OF EDGE: A SOFTWARE, STANDARD, AND GREEN BUILDING CERTIFICATION SYSTEM

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

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

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

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

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

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

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

4. **Repeat.**

---

### Results Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Final Energy Use</th>
<th>Final Water Use</th>
<th>Operational CO2 Savings</th>
<th>Embodied Energy Savings</th>
<th>Base Case Utility Cost</th>
<th>Incremental Cost</th>
<th>Payback in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes</td>
<td>439,329.51 kWh/Month</td>
<td>254.49 l/Res/night</td>
<td>-3.21 t CO2/Year</td>
<td>0.00 M3/m3</td>
<td>535,792.33 $/Month</td>
<td>105,710.62 $</td>
<td>1.56 Yrs</td>
</tr>
<tr>
<td>Hotels</td>
<td>329,233.76 kWh/Month</td>
<td>194.82 l/Guest/Night</td>
<td>1,044.38 t CO2/Year</td>
<td>0.46 M3/m3</td>
<td>347,839.69 $/Month</td>
<td>107,119.44 $</td>
<td>0.46 Yrs</td>
</tr>
<tr>
<td>Retail</td>
<td>254.49 l/Res/night</td>
<td>194.82 l/Guest/Night</td>
<td>0.00 M3/m3</td>
<td>0.00 M3/m3</td>
<td>93,031.56 $/Month</td>
<td>347,839.69 $</td>
<td>0.46 Yrs</td>
</tr>
<tr>
<td>Offices</td>
<td>254.49 l/Res/night</td>
<td>194.82 l/Guest/Night</td>
<td>0.00 M3/m3</td>
<td>0.00 M3/m3</td>
<td>93,031.56 $/Month</td>
<td>347,839.69 $</td>
<td>0.46 Yrs</td>
</tr>
<tr>
<td>Hospitals</td>
<td>254.49 l/Res/night</td>
<td>194.82 l/Guest/Night</td>
<td>0.00 M3/m3</td>
<td>0.00 M3/m3</td>
<td>93,031.56 $/Month</td>
<td>347,839.69 $</td>
<td>0.46 Yrs</td>
</tr>
<tr>
<td>Education</td>
<td>254.49 l/Res/night</td>
<td>194.82 l/Guest/Night</td>
<td>0.00 M3/m3</td>
<td>0.00 M3/m3</td>
<td>93,031.56 $/Month</td>
<td>347,839.69 $</td>
<td>0.46 Yrs</td>
</tr>
</tbody>
</table>

---

**Water Efficiency Measures**

- **Energy:** 22.91%
- **Water:** 23.91%

23.91% Meets EDGE Water Standard

**Energy Efficiency Measures**

- **Energy:** 20.55%

20.55% Meets EDGE Energy Standard

**Materials Efficiency Measures**

- **Materials:** 34.71%

34.71% Meets EDGE Materials Standard
• 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/](https://www.edgebuildings.com/marketing/research/)
ACKNOWLEDGEMENTS

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Visit www.edgebuildings.com for more information