



Hello, I am Prashant Kapoor, head of IFC's Principal Green Buildings Specialist

Session Agenda

- Importance of sustainable urbanization
- Approach of the World Bank Group
- IFC's approach to green buildings
- Demo of EDGE Homes Beta Tool



Before jumping into the agenda, I would like to quickly review who IFC is and how it fits into the World Bank Group.

The Mission of the WBG is to reduce poverty and boost shared prosperity in developing countries.

To implement this mission, the World Bank group works through 5 institutions:

- The World Bank (IBRD and IDA) which lends money and provides advice to governments in middle income and low income countries, respectively,
- the IFC which provides financing and advise to the private sector,
- MIGA which provides political risk cover to private investors,
- and ICSID which arbitrates Investment Disputes.

IFC is the largest development bank focused solely on the private sector – and we are the main driver of private sector development in the World Bank

We now have about 3,800 staff –located in about 95 developing countries world wide.

We have 3 main approaches:

- our mainstay investment work – which is to provide market based funding to private companies doing business in emerging markets.
- our advisory services work - which aims to help overcome barriers for private sector growth
- and our asset management company which leverages our expertise with third party capital.

We invest in a variety of industries, including infrastructure and natural resources, financial intermediaries (banks, insurance companies), manufacturing, agribusiness, and service industries such as health, education, retail and tourism.



So why is sustainable urban development so important to the WBG?

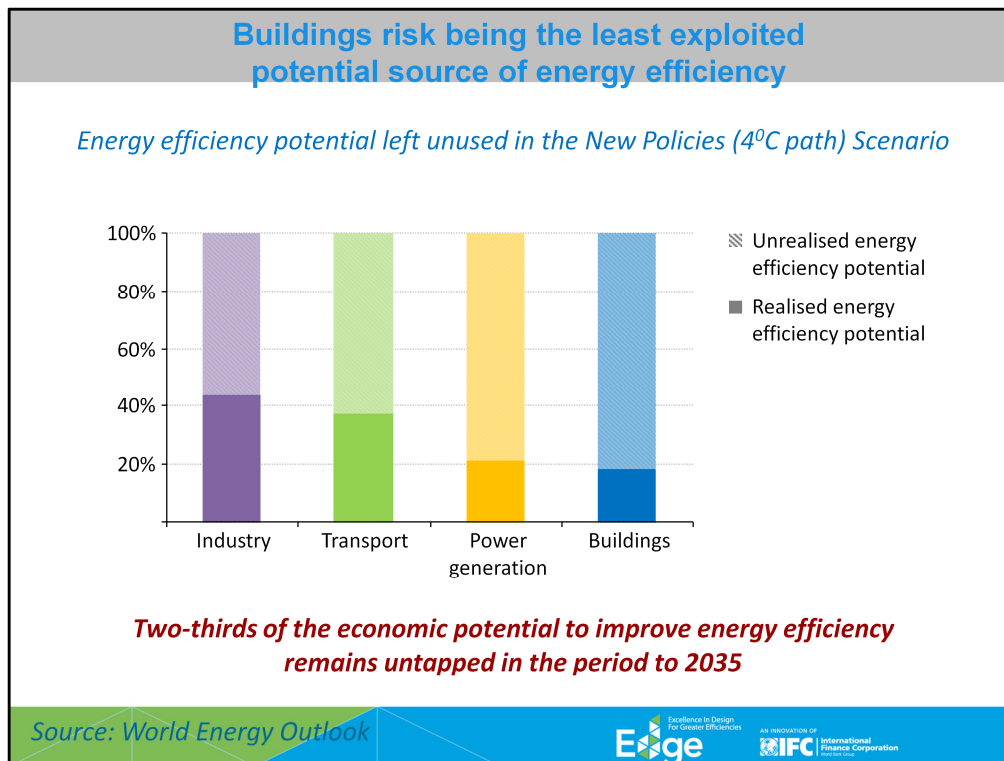
Climate change threatens to roll back years of development advances as agricultural yields fall, disease rises and extreme weather destroys homes and livelihoods. So addressing climate change is a priority for both IFC and the World Bank.

In the next few decades rapid urbanization will change the economies and lifestyles of people living in developing countries.

World **population** will reach 9 billion by 2050: 34% higher than today – growth will be fastest in poor countries, where population is expected to actually **double**.

50% of the world lives in cities today, and 70% will live in **urban** areas by 2050 – again, the biggest change coming in developing countries.

Population growth, combined with movement to the cities and rising incomes place cities at the heart of economic development, energy consumption and GHG emissions. Cities consume 66% of the world's energy today and account for 70% of current GHG emissions. The right urban policies can have huge economic and social impact as well as direct the trajectory for reducing GHG emissions in developing countries.



Buildings account for 15% of emissions today and emissions will double by 2030 under the IPCC high-growth scenario (the growth coming almost entirely from the developing world).

The urbanization trend we discussed create a huge demand for new build – and in particular housing. In fact, according to figures on new build from Pike Research/Navigant, housing will represent three quarters of all new build between now and 2020.

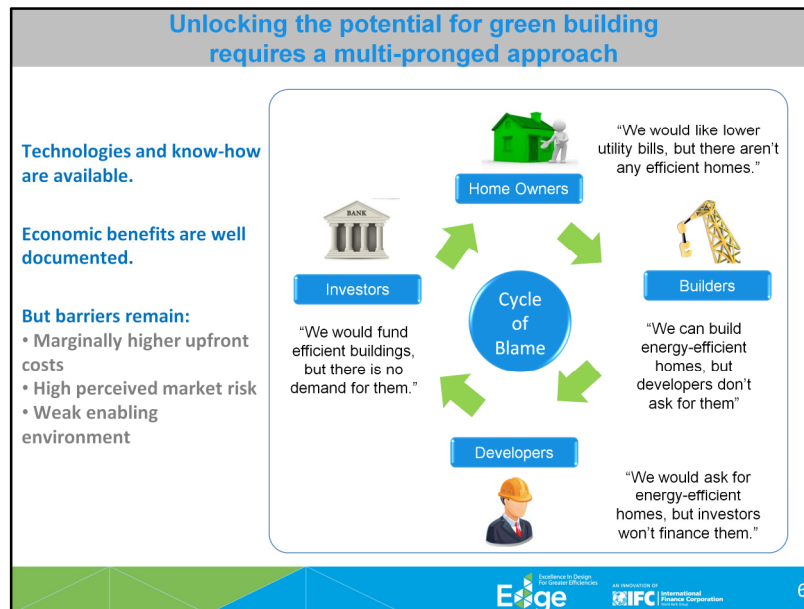
At the same time, with rising fuel prices, it makes economic sense to design this new build to save energy. For example, those living in low-income housing can often be paying 20% of their disposable income on utility bills.

BUT - according to the World Energy Outlook, even with current economic returns to improve efficiency in buildings, 80% of the economically viable energy savings in buildings is left untapped – more than in industry, transport, or power generation.

If the right investment choices are not made today, we will be locking into high-carbon urban infrastructure for the next 40 to 70 years.

Reducing urban GHG emissions requires innovation in urban planning and investment, service provision and regulations. The public sector will have to take a leading role – but private sector solution providers will also have to step up to the plate.

NEXT SLIDE: Why should so much economic value be left on the table when it comes to energy efficient buildings?



Why should so much economic value be left on the table when it comes to energy efficient buildings?

Technologies and know-how are not generally the problem. The economic benefits of building green are documented.

But the building sector is complex. There are many players and the divergence of interests and asymmetry of information and value creation between builders and buyers is key.

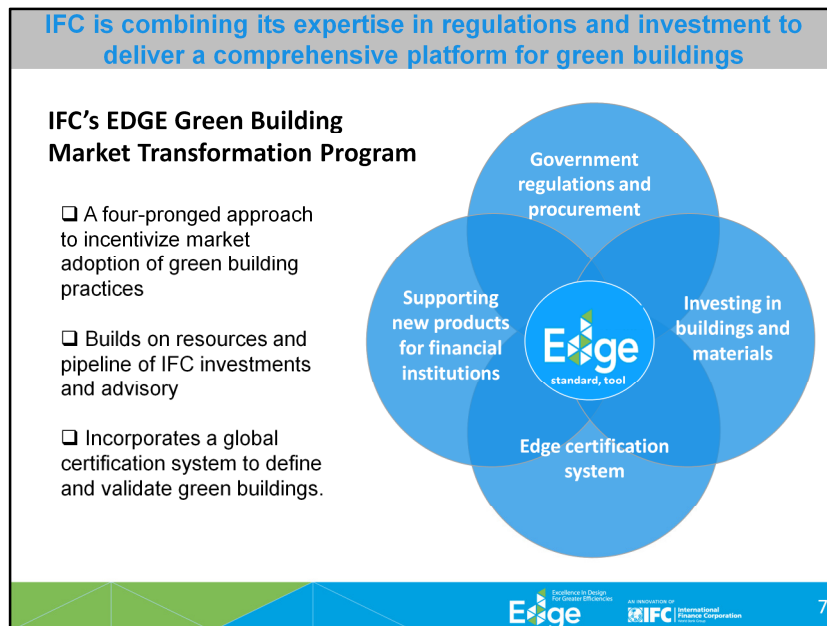
The main problems are

- 1) Perception of costs and affordability of green buildings are much higher than reality given falling technology costs. The World Green Building Council study showed that while the cost premium ranges from negative .5% to 12% higher, the perception is that it's from 1% all the way to 30% higher.
- 2) There are additional costs. Who pays? Developers don't want to absorb costs, while savings benefits go to owners.
- 3) For owners, especially in housing, immediate affordability often outweighs uncertain energy, water savings and long term appreciation.
- 4) Bankers don't want to provide additional financing to cover costs, because of the fear it will increase non-payment risk. They also don't want to establish systems to validate savings if there is not sufficient level of green building pipeline to finance.
- 5) Underlying this all is a lack of data on the financial benefits of green buildings – particularly in developing

markets. But some studies do exist for the developed world. For example, studies in the US and Europe show builders can command higher sales prices for green certified homes, ranging from 4 to 9% higher, with green homes selling as much as 4 times faster. Buyers save 15-20% on lower utility bills for green homes. The resale value is 4-10% higher. Banks enjoy a lower default rate from buyers of green homes – up to 33% lower.

Key is to addressing each parties concerns is to have a clear definition of a green building that

- 1) allows building designers to choose the lowest cost options to reach an agreed upon standard,
- 2) focuses on energy, water and materials savings for the end user that can be verified, and
- 3) that provides information and incentives to each party in the building eco-system.



So IFC has set itself the goal of moving the construction industry to a green path by reaching out simultaneously to all relevant parties through a multipronged program.

At the heart of the program is the EDGE green building design tool. EDGE stands for “excellence in design for greater efficiencies.” I will tell you more about the EDGE tool and give you a demonstration, but the role of the tool in this program is to provide an easy to understand standard for green buildings that focuses on cost savings, and GHG reductions through less use of energy in the building and in its materials.

That standard is 20% reduction in energy, 20% reduction in water, and 20% reduction in energy imbedded in building materials. The tool helps developers choose the lowest cost options for their project to achieve these standards.

With a clear definition of a green building, and the savings it generates, the program addresses each of the major players in the system.

- 1) In government regulations, our aim is to raise the bar and get incentives right. We also want to reduce disincentives – in Egypt, we found that there was a tax on double-paned glass, treating a great energy efficiency improvement as a luxury item. We are now working with a variety of city and national governments on green building codes. The process is slow as there are often gaps in implementation capacity.
- 2) IFC is also launching a voluntary green building certification program. The program grew out of the ask by our clients who wanted to design and build green but needed a way to communicate and verify the benefits of efficiency to their investors and their end users. The emphasis of our program is on the mass market, with a low-cost, easy-to-use tool that reveals efficiencies at an early design stage and helps builders understand pay back periods for the cost premium. We have been using EDGE with our clients and certified 2 pilot projects – a housing development project by Mexican builder Vinte and 5 hotels in Mexico and Costa Rica by City Express hotel chain.
- 3) The certification system drives the creation of green building stock and let’s developers get credit for building green. IFC is using our balance sheet to fund developers demonstration projects. To date, we have invested in over \$500 million world wide.

People ask us why the standard for EDGE is only focused on 3 areas and reaches a reduction of 20%. In developing countries, we are seeing very low penetration rates for green buildings – for example, in India approximately 3% of new construction is registered for green certification. Meanwhile, India is expected to double its residential stock by 2030, while China alone is building the equivalent of square footage in Latin America in the next 10 years.

We have purposely focused on simple, low cost, achievable goals in order to get developing countries to take the first step on the green path. Size and scale matter. Transitioning a sizeable chunk of the upcoming building stock to be more energy efficient is needed if we are to bend the trajectory of GHG emissions in the next 10 years. The objective of this program is to achieve a 20% penetration in our target markets/sectors within 7 years of launching an EDGE program.

4) Finally, financing is key. IFC has relationships with almost 1,000 Banks around the World. Getting banks to understand and value the savings from building green is key to supporting the transition to this green path. The exciting thing about green buildings is that the investment and financing for the construction industry already exists. The challenge is to incorporate the additional upfront costs for resource efficiency into the financing which is paid for out of the increased savings, better credit ratings, and higher resale values of the green buildings. IFC is working with financial institutions to support new products such as green mortgages, and green construction finance. Banks are also worried about putting in the resources to develop new products, train staff, and convince their management to take perceived risks if there is no reliable flow of green buildings stock. That is why we must work on both sides simultaneously – building stock, while securing financing.

So - how far have we come with the program to date?

Latin America



Case Study: City Express



\$37 M in loans for new hotels; EDGE certification for 5 hotels in MX, CO

Features: smaller windows, double glazing, insulation, HVAC, lighting, concrete construction



Case Study: Vinte

Developer for affordable, sustainable homes, long-standing IFC client

Features: solar hot-water, water efficient fittings, low energy light bulbs and smart meters





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IFC has a very strong green building presence in Latin America.

Our first two pilot projects for EDGE certification were in this region.

We have done \$172 M in investments – particularly in Mexico - including home developers, green hospitals, property funds, and energy services companies (ESCOs).

Our advisory work on green building codes is almost completed in Colombia, and is underway in Peru and Panama.


Asia




Case Study: Indonesia Codes

Code in effect as of 2013 after IFC advisory engagement; now working on national codes

Features: simple to implement, effective, easy to monitor




Case Study: Dewan Housing




\$70M loan with \$15 M blended finance via IFC-Canada Climate Change Program

Affordable mortgages for green homes



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We are also focusing on Asia as one of the fastest growing regions, where GHG savings potential is tremendous.

We have a very strong engagement on building codes. IFC helped pass the code in Jakarta, which went into effect in January of 2013. Our guiding principle was to create a code that was simple to implement, effective, and easy to monitor. Indonesia is now rolling out the code on a national basis. We also have engagements in Philippines and Vietnam, and a memorandum of understanding with China's NDRC.

In South Asia, our focus is India, a country which is experiencing explosive growth in construction. Here, IFC's focus is on the municipal level, helping city governments roll out building codes. In addition to home developers, we have had successes with green hospitals, as well as with green mortgages, working through financial intermediaries like Dewan Housing bank.

Africa

Case Study: South Africa

Focus on low-income housing market

MOU with South Africa Green Building Council, partnership with ESCOM, relationships with banks



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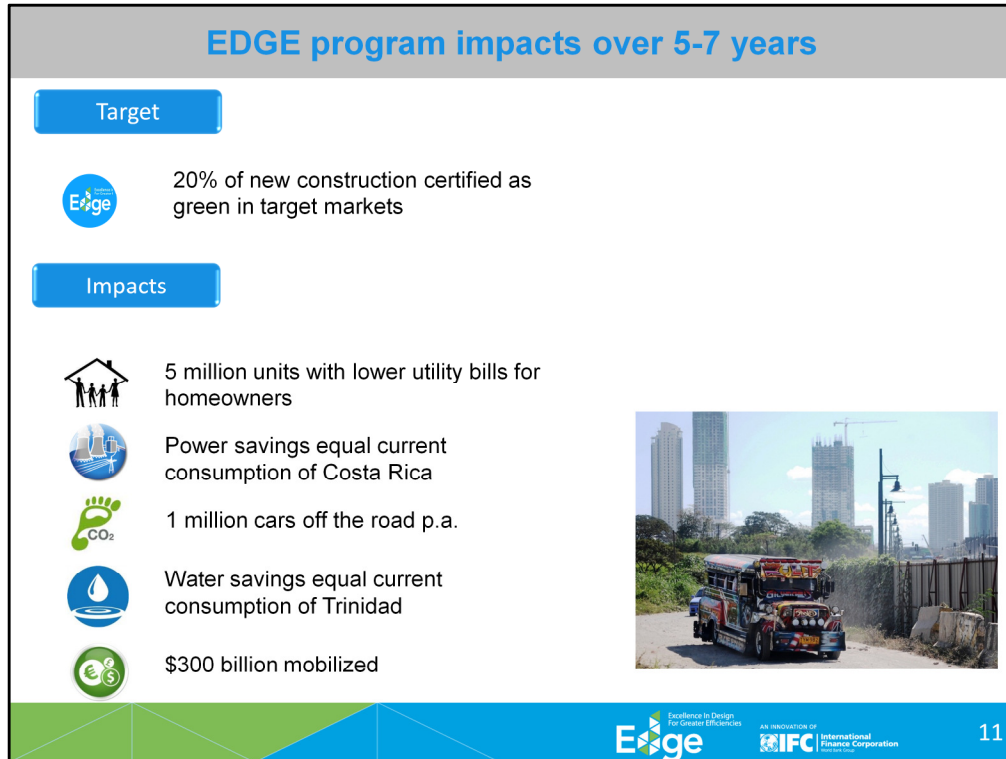
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While we have had some investments throughout Africa, our focus is on South Africa – another fast growing market.

Here, we are looking at the gap in affordable housing.

So far, we have an MOU with the South African Green Building council and have developed relationships with the local utility – ESCOM – as well as the local banks.



How ambitious are we?

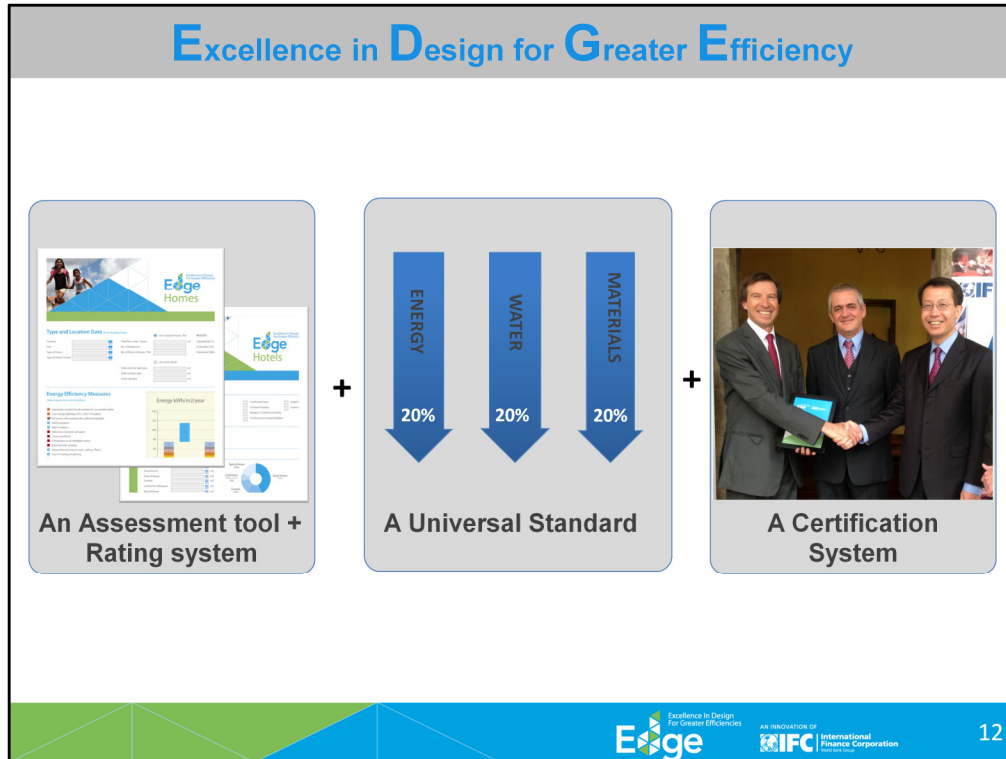
We are aiming at a certification penetration of 20% in targeted markets – hopefully a tipping point beyond which developers will frame the question “why would I not go green” rather than “what would going green mean?” – because we believe this would indicate a fundamental transformation in the way the building market works.

This equates to 5 million units with lower utility bills for homeowners.

By year seven the program will also save building owners about 5000 GWh electricity (equivalent to Costa Rica consumption) and 150 million M³ water (equivalent to Trinidad and Tobago consumption) every year.

GHG reductions will be equivalent to one million cars off the road.

We are aiming to help catalyze up to \$300 billion in private sector investment in green buildings over that period.



EDGE is a building design tool, a certification system, and a global green standard for nearly 100 emerging economies. The platform is intended for anyone who is interested in the design of a green building, whether an architect, engineer, developer, or building owner.

EDGE Tools

EDGE empowers the discovery of technical solutions at the early design stage to reduce operational expenses and environmental impact. Based on the user's information inputs and selection of green measures, EDGE reveals projected operational savings and reduced carbon emissions. This overall picture of performance helps to articulate a compelling business case for building green.

- EDGE has contextual data of utility costs and climate for different cities
- EDGE uses building physic calculations based broadly to give design-specific results
- EDGE uses a monthly quasi-steady-state calculation method based on the European CEN and ISO 13790 standards
- EDGE provides an investment planning tool for building owners and developers

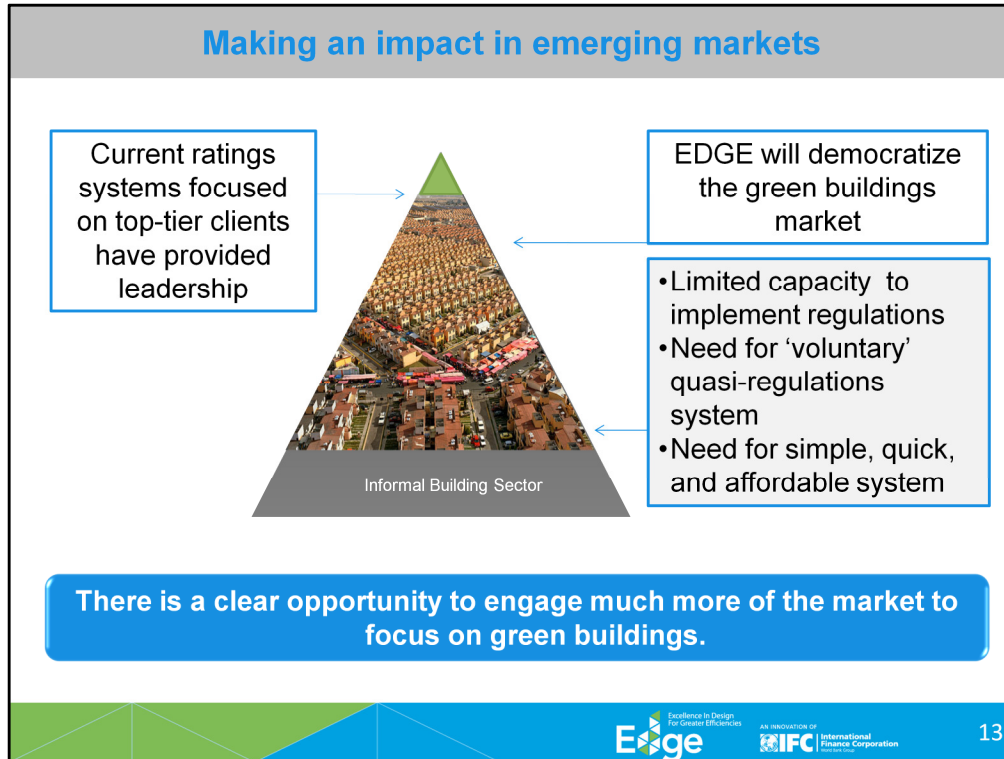
The suite of EDGE tools includes homes, hospitals, offices, hotels, and retail supported by building-specific user guides.

The EDGE Standard.

- To achieve the EDGE standard, a building must demonstrate a 20% reduction in operational energy consumption, water use, and embodied energy of materials as compared to typical local practices.
- EDGE defines a global standard while contextualizing the base case to the occupants and their location.

EDGE Certification

- Projects that meet the EDGE standard will receive a certificate confirming the project's predicted performance
- This can be used for corporate branding, marketing, and accessing better finance
- The Certification will be delivered through Certification Partners (IFC is currently identifying partners)



In developed countries, we have seen large scale adoption of GB certification such as, BREEAM in the UK and LEED in US. EPC and strong building regulations/policies have also push the building industry toward higher efficiency.

In the emerging economies, the GB certification systems have had mainly focused on top-tier clients.

these counties also limited capacity to implement mandatory regulations.

Given the fast pace of growth in the building sectors there is a danger that inefficiencies will get locked-in if large scale efficiency standards are not promoted.

Three main innovations are required to create a large-scale adoption of Green Building Standards in developing countries:

- 1.) Simplification of assessment criteria and therefore reducing the time and cost to meet the standard,
- 2.) Sharp focus on areas of resource use in buildings i.e., energy consumption, water consumption, and materials consumption, and
- 3.) Provision of an integrated tool which recommends cost-effective solutions to make the building design and specification 'green'.

It is with this background that Excellence in Design for Greater Efficiencies (EDGE) was conceptualized and initiated.

More Information

ifc.org/edge

find us



EDGE Homes Beta
is not yet publicly
available.

As a registered attendee to
this webinar, you will be
notified the moment the
application becomes open
for public use.

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We are very excited to demo the EDGE tool for you.

However, please know that the EDGE application is in beta testing and is NOT yet available publicly.


Since you have registered for this webinar, we will use your contact information and notify you the moment the application becomes open for public use.

Select Location & Climate Data





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Design
Green Measures
Download Results

Location & Climate Data

Choose context data in order for EDGE to begin to prepare the background calculations for your project.

Country:

City:


Income Category:

Climate Type:

Air Conditioning:

Space Heating:

Ceiling Fans:



Building Data

Enter building data so EDGE understands more about your project.

Type of Home:

Average Unit Area (m2): m2

No. of Bedrooms/Unit: no.


No. of Floors: no.

No. of Units: no.


Area Details

Enter area details if available, otherwise you may opt for defaults.

	Default	User Entry
Bedroom (m2)	44.0	<input type="text" value="0.0"/>
Kitchen (m2)	12.0	<input type="text" value="0.0"/>
Living/Dining (m2)	35.0	<input type="text" value="0.0"/>
Toilet (m2)	3.6	<input type="text" value="0.0"/>



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Choose Mexico- Mex. City

EDGE loads location-specific information within EDGE (currently data exists for nearly 250 large cities in developing countries):

- Monthly average wet and dry bulb temperature
- Monthly average outdoor wind velocity
- Monthly average outdoor humidity
- Solar radiation intensity
- Annual average rainfall
- Carbon dioxide intensity of the electricity grid
- Average cost of energy (by fuel type) and water

Input Building Data and Area Details






Design
Green Measures
Download Results

Building Data

Enter building data so EDGE understands more about your project.

Type of Home: Flats/Apartments

Average Unit Area (m2): m2

No. of Bedrooms/Unit: 3 no.

No. of Floors: no.

No. of Units: no.

Occupancy (People/Unit): no.

Area Details

Enter area details if available, otherwise you may opt for defaults.

	Default	User Entry
Bedroom (m2)	44.0	<input type="text" value="0.0"/>
Kitchen (m2)	12.0	<input type="text" value="0.0"/>
Living/Dining (m2)	35.0	<input type="text" value="0.0"/>
Toilet (m2)	3.6	<input type="text" value="0.0"/>
Utility, Balcony, Service Shaft (m2)	5.4	
Gross Internal Area (m2)	100.0	<input type="text" value="100.0"/>
External Wall Length m/Unit	28.9	<input type="text" value="0.0"/>
% Window to Wall Ratio	30%	<input type="text" value="0"/>



Key Assumptions

If you know your fuels, select them from the dropdown menus. You may also fine-tune the costs of utilities and other key assumptions by over-riding the defaults. This will make your EDGE results more accurate. Please provide your data source should you choose to over-ride the temperature fields.

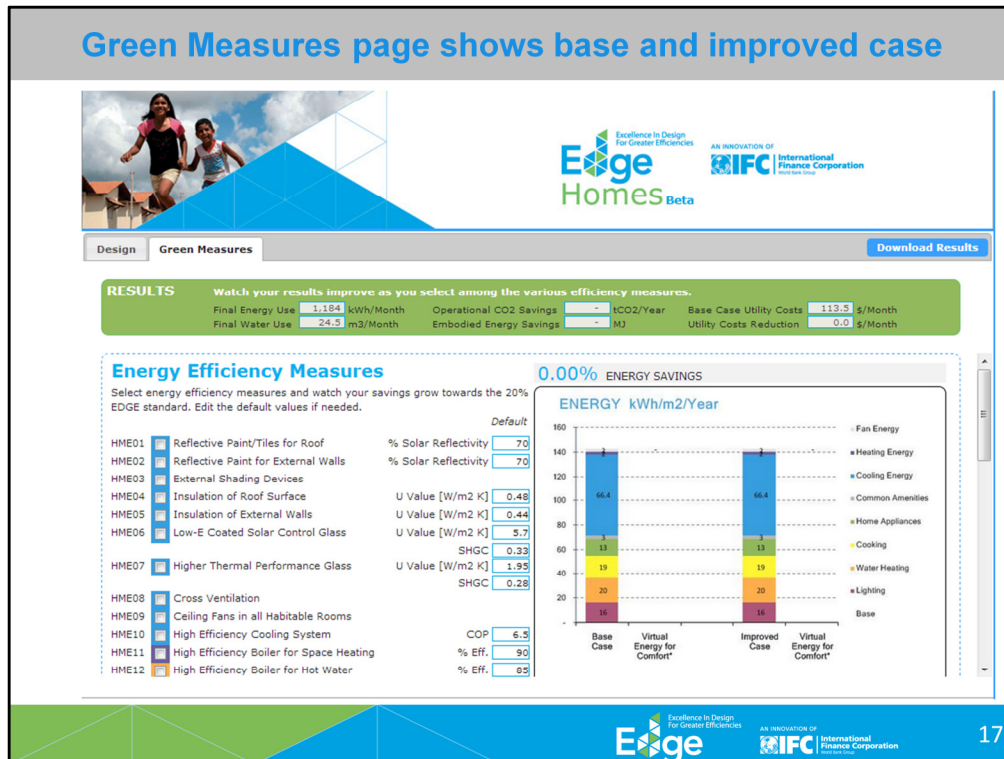
Fuel Used for Cooking: Natural Gas

Fuel Used for Water Heating: Natural Gas

Monthly Average



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Choose 55m2; 5 stories.
 The area is automatically calculated;
 which can be refined at the detailed design stage.



Creates Base Case energy/m2. where the energy will be used.
Choose Veracruz and show how the base case changes

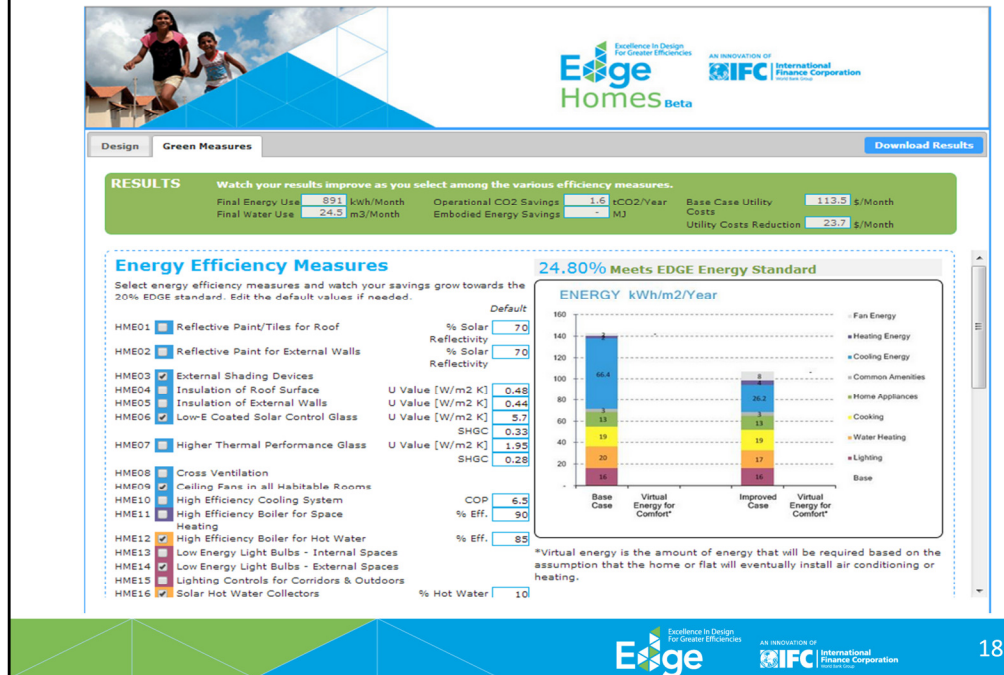
This benchmark in itself should be useful-as in most countries this does not exist.
Improved case is the same to begin with
Show "Results" per apartment

Measures –useful mouseovers

Click Shading, show %EE change
Choose insulation change U-Value
Choose lighting
Choose Solar DHW change % to 60%

Explain 'Virtual Energy for Comfort' by changing A/C to "No"

Improved case results change when measures are ticked



Water Efficiency Measures are connected to Energy Efficiency



Edge
Homes Beta

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Design Green Measures

Download Results

RESULTS

Watch your results improve as you select among the various efficiency measures.

Final Energy Use 889 kWh/Month Operational CO2 Savings 1.6 tCO2/Year Base Case Utility Costs 119.5 \$/Month
Final Water Use 17.7 m3/Month Embodied Energy Savings - MJ Utility Costs Reduction 27.2 \$/Month

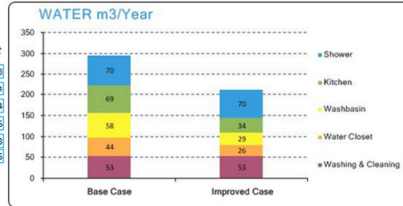
Water Efficiency Measures

Select water efficiency measures and watch your savings grow towards the 20% EDGE standard. Edit the default values if needed. Note that certain water efficiency measures may impact your energy efficiency results.

- HMW01 ☐ Low-Flow Showerheads
- HMW02 ☒ Low-Flow Taps for Kitchen Sinks
- HMW03 ☒ Low-Flow Taps for Washbasins
- HMW04 ☒ Dual Flush for Water Closets
- HMW05 ☒ Single Flush for Water Closets
- HMW06 ☒ Rainwater Harvesting System
- HMW07 ☒ Recycled Grey Water for Flushing
- HMW08 ☒ Recycled Black Water for Flushing

Default
Lt./min 8
Lt./min 4
Lt./min 4
1st - Lt./flush 6
2nd - Lt./flush 3
Lt./flush 6

27.8% Meets EDGE Water Standard

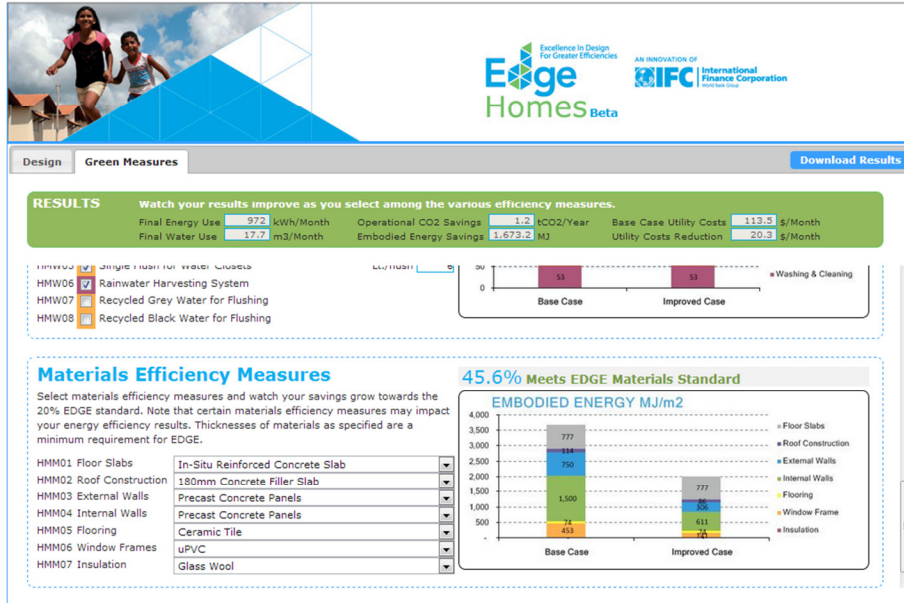


Edge

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Materials section measures embodied energy of materials



Downloadable pdf produces a results report

EDGE Details

Project Owner Name: _____

Project Name: _____

House or Apartment Block: _____

Project Owner Email: _____

Project Owner Phone: _____

Project Address Line 1: _____

Project Address Line 2: _____

Project City: _____

Project Postal Code: _____

Project Country: _____

Location & Climate Data

Country: Mexico

City: Mexicali

Nearest City: San Felipe

Climate Type: Humid

Air Conditioning: Yes

Space Heating: Yes

Cooling Fans: No

Building Data

Type of Home: Flats/Apartments

Average Unit Area (sq ft): 180 m²

No. of Bedrooms: 3 m²

No. of Floors: 10 m²

No. of Units: 20 m²

Occupancy (people/unit): 4 m²

Area Details

Bedroom (m²): 42.8

Kitchen (m²): 12.8

Living/Dining (m²): 35.8

Tuber (m²): 3.5

Units, Balcony, Service Area (m²): 5.4

Green Internal Area (m²): 100.5

External total Length (m): 28.5

Windows in total (Ratio): 30%

Key Assumptions

Fuel Used for Cooking: Natural Gas

Fuel Used for Water Heating: Natural Gas

Fuel Used for Space Heating: Natural Gas

Default: User Entry

Cost of Electricity: 0.08 \$/kWh

Cost of Diesel Fuel: 0.75 \$/L

Cost of Natural Gas: 0.57 \$/SCF

Cost of Water: 0.50 \$/M

Cost of Sewer: 0.50 \$/M

CO₂ emissions (kg/kWh of Electricity): 0.45 kg/kWh

Windows in total Ratio: 30% v %

Roof U Value: 1.4 0.50 W/m²K

Wall U Value: 1.8 0.50 W/m²K

Glazed U Value: 6.5 0.50 W/m²K

Shade SHGC: 0.4 0.50 W/m²K

AC System Efficiency: 2.00 0.50 COP

RESULTS

Final Energy Use: 972 kWh/m²year

Operational CO₂ Savings: 1.2 tCO₂/year

Base Case (100% Green): 1,173.2 MJ/m²year

Estimated Energy Savings: 1,873.2 MJ/m²year

CO₂ Savings Reduction: 2%

Energy Efficiency Measures

H0001 Reflective Paint/Face for Roof: Solar Reflectivity: 70 %

H0002 Reflective Paint for External Walls: Solar Reflectivity: 70 %

H0003 External Shading Devices: Yes

H0004 Insulation of Roof Surface: U Value (2010) U: 0.48

H0005 Insulation of External Walls: U Value (2010) U: 0.44

H0006 Low-E Coated Solar Control Glass: Yes

H0007 Higher Thermal Performance Glass: U Value (2010) U: 1.05

H0008 Climate Ventilation Optimisation: Yes

H0009 Ceiling Fans in all habitable Rooms: COP: 0.5

H0010 High Efficiency Cooling System: Yes

H0011 High Efficiency Hot Water Gas Boiler: Yes

H0012 High Efficiency Light Bulbs - Internal Spaces: Yes

H0013 Low Energy Light Bulbs - External Spaces: Yes

H0014 LED Lighting Controls for Corridors & Outdoors: Yes

H0015 Solar Hot Water Collectors: Yes

H0017 Solar Photovoltaics: Yes

17.8% MEETS ENVELOPE SAVINGS

ENERGY kWh/m²year

Base Case: 972 kWh/m²year

Virtual Energy for Comfort: 1,173.2 kWh/m²year

Improved Case: 1,873.2 kWh/m²year

Water Efficiency Measures

H0001 Low-Flow Showers: Yes

H0002 Low-Flow Taps for Kitchen Sinks: Yes

H0003 Low-Flow Taps for Toilets: Yes

H0004 Dual Flush for Toilet Cisterns: Yes

H0005 Single Flush for Water Closets: Yes

H0006 Non-Recirculating System: Yes

H0007 Reclaimed Grey Water for Flushing: Yes

H0008 Reclaimed Black Water for Flushing: Yes

27.8% MEETS EDGE Water Standard

WATER l/Day/Person

Base Case: 150 l/Day/Person

Improved Case: 42 l/Day/Person

Materials Efficiency Measures

H0001 Floor Slabs: In-Situ Reinforced Concrete Slab

H0002 Roof Construction: Heavy Concrete Floor Slab

H0003 External Walls: Precast Concrete Panels

H0004 Internal Walls: Precast Concrete Panels

H0005 Flooring: Ceramic Tiles

H0006 Window Frame: uPVC

H0007 Insulation: Glass Wool

45.6% MEETS EDGE Materials Standard

EMBODED ENERGY MJ/m²

Base Case: 2,500 MJ/m²

Improved Case: 1,100 MJ/m²

*Virtual energy is the amount of energy that will be required based on the assumption that the home will be eventually moved to a building in the future.

EDGE Details

EDGE Details

EDGE Details

EDGE Details

EDGE Details

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