Towards 30% Climate Finance: How can buildings contribute to it?

Guide for the incorporation and accounting of mitigation and adaptation measures to climate change

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Infrastructure and Energy Sector

Social Sector

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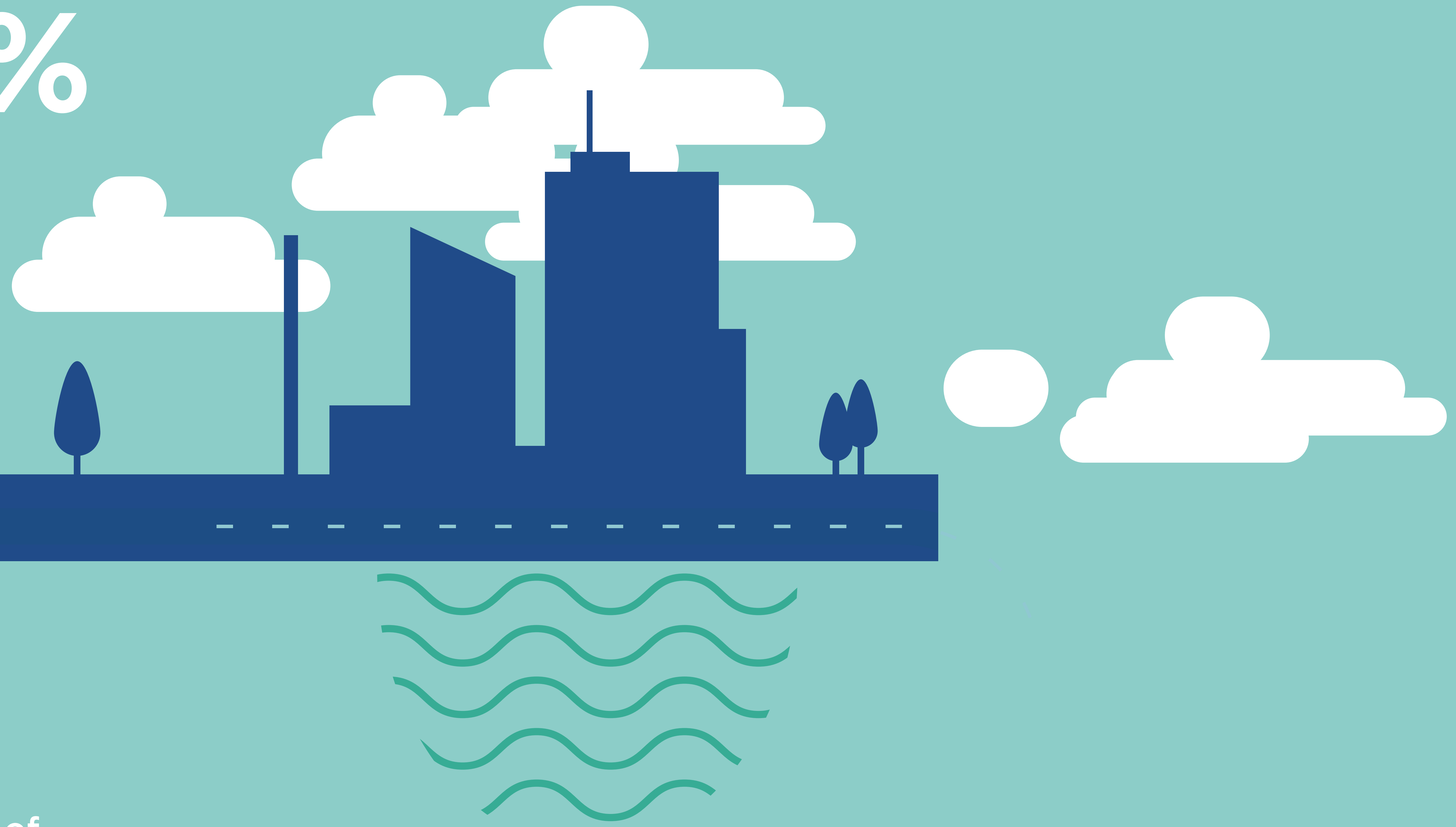
Social Infrastructure

Towards 30%

CLIMATE FINANCE:



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IDB

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Abreviations

IDB: Inter-American Development Bank

MDB: Multilateral Development Banks

CC: Climate Change

CSD/CCS: Climate Change Division

FC: Climate Finance

IDB Group: It comprises the Inter-American Development Bank, the IDB Invest and the Multilateral Investment Fund

INE/ENE: Energy Division

INE/INE: Infrastructure and Energy Sector

INE/WSA: Water and Sanitation Division

POD: Proposal for Operations Development

QRR: Quality and Risk Review

SCL/SCL: Social Sector

Background

In 2017, the Management of the Infrastructure and Energy Sector (INE/INE) and the Management of the Social Sector (SCL/SCL) agreed to create the Social Infrastructure Unit to provide specialized technical support for programs and projects financed by the Bank's Social Sector that have infrastructure components.

The Social Infrastructure Unit has the following goals: (i) to strengthen the social sector teams, and through them, the executing units, offering technical expertise for the preparation, execution and supervision of the infrastructure components included in the portfolio of operations, and (ii) to generate knowledge aimed at promoting good practices in planning, procurement, design, construction and supervision of social infrastructure.

This document, the result of this experience, explains how buildings of social infrastructure and other sectors can contribute to the fulfillment of the 30% goal of climate financing that the IDB Group has set for 2020, outlining those climate change mitigation and adaptation measures that can be incorporated and accounted for in projects of the Bank that include design, improvement and/or construction of buildings. With the adoption of the Paris Agreement on Climate Change (2015), the countries made a commitment that goes beyond 2020. They pledged to, in the medium and long term: stop the increase in the global average temperature at 2 °C - and to make the best effort to maintain it below 1.5 °C - which includes directing financial resources to development routes that are low in greenhouse gas (GHG) emissions and, in turn, resilient to climate change. For buildings, this means, for example, improving and expanding measures such as energy efficiency and identifying the physical risks that climate change presents to infrastructure.

The inclusion of these measures to reduce GHG emissions and to reduce the vulnerability in buildings, in addition to generating benefits for the environment, can generate social and economic benefits that result in the improvement of the quality of operations. This represents, especially in public social infrastructure buildings, an excellent opportunity to show the application of innovative practices in construction-related issues in the region and to promote its dissemination from emblematic projects that can become cultural references for societies in which they are inserted.

This Guide counted with the invaluable collaboration of all the members of the Social Infrastructure Unit: Wilhelm Dalaison, Marcos Camacho, Juliana de Moraes and Iciar Hidalgo (INE/INE), who contributed to the assessment and completion of the document throughout its development.

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1. Introduction

The Inter-American Development Bank (IDB), with other multilateral development banks (MDB),[1] seeks to face the challenges of climate change (CC) increasing the financing of actions aimed at reducing and counteracting its effects. This financing is recognized as climate finance (FC).

In 2011, a group of six MDBs published a first **Joint Report** that recognized the urgency of joining forces in this matter and presented a common methodology to be used by these MBDs, seeking to standardize the methodology of accounting for resources invested in CC mitigation and adaptation measures. The most recent edition of the **Joint Report** 2017) provides an update and expansion of the previously designed methodology and represents an effort to make public the figures of FC in developing countries and emerging economies. Within that framework, the IDB Group has set the goal that 30% of the total amount of operations approved by 2020 are invested in activities related to CC.

The building infrastructure[2] of several sectors, both in the public and private areas, represents a significant percentage of IDB loans and, therefore, a great opportunity to boost the FC through the promotion of infrastructure that mitigates and adapts to CC. However, in 2016, for example, the Social Sector only accounted for 0.2% of FC of the total amount approved and, in 2017, to 11.1%, despite having important infrastructure componentsa.[3] This increase demonstrates the growing interest in including measures that contribute to mitigate or adapt buildings to CC. However, many Team Leaders, even if they intend to include aspects related to CC, do not have the information to determine which of the measures are relevant and/or how to leave them properly reflected in the documents taken into account when making the FC accounting.

This document, organized by the Social Infrastructure Unit, with the collaboration of specialists in CC, energy, water, and solid waste, is intended to provide Guide for the incorporation and accounting of climate change mitigation and adaptation measures to IDB's Team Leaders and project executors that include building design and construction. The main goals are: (i) to encourage climate investments for all projects that include construction and/or renovation of buildings and/or equipment replacement, (ii) to improve the capacity for adaptation and resilience of buildings to CC and (iii) to guarantee the accounting of investments eligible as FC in Bank operations to contribute to the 30% goal, in accordance with the Joint Methodology of the MDBs.[4]

1 African Development Bank (AfDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB), Inter-American Development Bank Group (IDBG), Islamic Development Bank (IsDB) and World Bank Group (WBG), among others.

2 Building infrastructure is understood as the construction of the buildings and all the work linked to it.

3 In the Education Division (SCL/EDU), for example, approximately 75% of operations have infrastructure components, which represent approximately 50% of the total amount approved.

4 The Joint Methodology was developed by the MDBs to calculate and report homogeneously the amount of resources invested in CC-related activities and includes a procedure focused on mitigation actions and another focused on adaptation actions.

2. Climate financing in building infrastructure

The effects of CC affect countries at various levels, including people, the activities they carry out and their infrastructure, directly influencing their development capacity. To deal with CC, there are, in general terms, two types of strategies: mitigation and adaptation. **Mitigation measures** are aimed at reducing GHG emissions or improving their capture through carbon sinks[5] and, in the case of infrastructure, focus on strategies aimed primarily at energy saving, use of renewable energy, management of waste, among others. **Adaptation measures** focus on reducing the vulnerability and risks generated by the CC[6] and, for the specific case of the building infrastructure, are aimed at strengthening the resilience of buildings.

It is important to note that the estimated amount of an operation corresponding to FC is carried out by the Climate Change Division (CSD/CCS) in the preparation stage, specifically during the Quality and Risk Review (QRR) process.[7] In order to account for the FC, the Proposal for Operations Development (POD) and its annexes are used as inputs. It should be noted that this estimate, once calculated during the QRR, can still be recalculated if the project is modified and/or new information arises, as long as this occurs prior to the approval of the operation.

Therefore, information on the measures to be implemented and their cost estimates must come from the project team itself during project preparation and must be provided by the Team Leader to the CSD/CSS specialist. Although many times in the preparation phase there are no architectural designs, in this phase it is possible to define whether there is an intention to incorporate specific measures into the projects and to study which of them would be the most appropriate for a given project according to the context.

In projects in which a CSD/CSS specialist is part of the team, the team may collaborate with the Team Leader to define and quantify the actions to be taken. Likewise, the Social Infrastructure Unit team may collaborate with the Team Leaders in the definition of appropriate measures for each specific project, providing support in the technical dialogue with the executing units, with colleagues of the CSD/CSS, and in the preparation and drafting of the documents required by the Bank.

The following chapters include detailed examples of the CC mitigation and adaptation measures that can be incorporated into Bank projects including: design, improvement, and construction of buildings, per the Joint Methodology.

5 In general terms, a carbon sink is a deposit for carbon that can be natural (for example, woods and forests) or artificial, which absorbs carbon from the atmosphere contributing to its reduction in the air.

6 The CC affects the frequency and intensity of certain natural phenomena, such as floods, hurricanes and cyclones, droughts, fires, storms, cold and heat waves. It should be noted that applying protection measures for rising tides or floods that occur in rainy seasons in an extraordinary way, although it is good practice, does not represent a solution for adaptation to CC. Only those measures that respond to certain scenarios affected by CC, with a certain return period, are considered FC.

7 According to the Operations Processing Manual (PR)

3. Mitigation measures to climate change

This chapter describes the Joint Mitigation Methodology and the eligible activities in accordance therewith. It includes detailed examples of the CC mitigation measures that can be incorporated into Bank's projects for the design, improvement, and construction of buildings.

3.1. Joint Methodology for Financing Mitigation to CC

The Joint Mitigation Methodology of the MDBs defines a series of attributes[8] that projects have to fulfill for their accounting as FC, as well as a List of Eligible Activities. Among the attributes, it should be noted:

i. Additionality: the estimate focuses on the specific activities and not on the general goal of the operation, focusing on the type of activities to be carried out.

ii. Timeline: the FC's contribution estimate is made before the implementation of the project (during approval or at the time to finalize the financial commitment).

iii. Conservatism: it is preferable to have a conservative approach, accounting for FC only if it is based on defined information, rather than including estimates without sufficient support, especially when the information is not available, and there is some level of uncertainty.

iv. Disaggregation: only mitigation activities that, to the extent reasonably possible, can be defined as such are quantified as FC. If such disaggregation is not possible using the project data, a qualitative evaluation or an analysis based on previous projects can be performed to identify the proportion of the project that covers climate change mitigation activities, following the principle of conservatism.

v. Scope: mitigation activities or projects to be accounted for may consist of an independent project, multiple independent projects under a broader program, a component of an independent project or a program financed through a financial intermediary.

vi. Eligibility: not all activities that reduce GHGs in the short term are eligible to be counted for the FC, but only those included in the Eligible Activities List.[9]

vii. Avoid double counting: when the same project, subproject or element contributes to the CC mitigation and adaptation, it will be determined what proportion is counted as one or the other, so that financing is not recorded twice.

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8 See Annex C of the document **Joint Report On Multilateral Development Banks' Climate Finance.**

9 Section 3.2 shows the eligible activities applicable to building projects. For the complete table, see Annex C, Table A.C.1 .: List of Eligible Activities for classification as CC mitigation financing, of the document **Joint Report On Multilateral Development Banks' Climate Finance.**

3.2. Activities Eligible for FC

The List of Eligible Activities included in the Joint Methodology for FC applies to all development sectors, not only the construction sector. From the total of the activities defined in the Joint Methodology, listed below, only those categories of mitigation activities that apply to building construction projects are extracted:

It is important to remember that the goal of mitigation measures is the reduction/capture of GHG and that this goal can be achieved in different ways, according to the context. Therefore, it is important to carry out a previous analysis to identify the most appropriate and efficient measure(s), depending on the type of project, context, and budget. For example, it is important to study the winds and find out the wind potential of an area, before opting for wind generation solutions; as well as it is important to study solar radiation before opting for photovoltaic generation systems.

LIST OF ELIGIBLE MITIGATION ACTIVITIES: PART ONE		
CATEGORY	SUBCATEGORY	ELIGIBLE ACTIVITIES
Renewable Energy	Energy generation	Wind energy.
		Solar energy (concentrated solar energy and photovoltaic energy).
		Biomass or biogas energy (only if the reduction of net emissions can be demonstrated, taking into account production, processing, and transportation).
		Hydraulic energy.
	Heat production or other uses of renewable energy	Solar water heating and other thermal uses of solar energy in all sectors.
		Thermal uses of geothermal energy in all sectors.
		Wind-driven pumping systems or similar uses.
		Thermal uses of sustainable/produced bioenergy in all sectors, including efficient and improved biomass stoves.
Energy efficiency	Readjustment (retrofit) of existing buildings	Improvement of energy efficiency in lighting, appliances, and equipment.
		Replacement of existing heating/cooling systems in buildings with cogeneration plants that produce electricity in addition to providing heating/cooling.
		Readjustment (retrofitting) of existing buildings: architectural or construction changes that allow reduction of energy consumption.
	Design and construction of new buildings	Use of highly efficient bioclimatic architectural designs, equipment, and low consumption appliances, as well as construction techniques that reduce the energy consumption of the building, exceeding the available standards and complying with certification or energy efficiency rating schemes.
Agriculture, forestry and land use	Afforestation, reforestation, and biosphere conservation	Afforestation (plantations) and agroforestry in non-forested lands.

LIST OF ELIGIBLE MITIGATION ACTIVITIES: PART ONE		
CATEGORY	SUBCATEGORY	ELIGIBLE ACTIVITIES
GHG reduction by other non-energy sources	Air conditioning and refrigeration	Re-adaptation of existing industrial, commercial, and residential infrastructure to change for a cooling agent with less global warming potential.
Waste and wastewater	Wastewater	Part of the wastewater treatment that reduces methane emissions (only if the reduction of net GHG can be demonstrated and if there is no compliance requirement such as a performance standard or safeguard requirement).
	Solid waste management	Projects to convert waste into energy.
		Recovery, recycling, and waste management projects that recover or reuse materials and waste as inputs in new products or as a resource (only if net emission reductions can be demonstrated).
Transport	Modal change in urban transport	Non-motorized transport (bicycles and pedestrian mobility).
	Infrastructure for low carbon transport	Charging stations and other infrastructure for electric vehicles, hydrogen or dedicated biofuel fuel.
Low-carbon technologies	Research and development	Research and development of renewable energy or energy-efficient technologies or low-carbon technologies.
Cross-cutting issues	Support to national, regional or local policy, through technical assistance or policy-based loan	Education, training, capacity building, and awareness on CC mitigation, sustainable energy or sustainable transport and mitigation research.
		Other policy and regulatory activities, including those of non-energy sectors, for CC mitigation or dissemination of climate action, such as incentives for low carbon vehicles or sustainable afforestation standards.
Others	Other activities with net GHG reduction	Any other activity, if agreed by the MBDs, can be added to the joint typology of mitigation activities, when the results of the ex-ante GHG accounting (carried out according to commonly agreed methodologies) show emission reductions that are higher than a commonly agreed threshold, and are consistent with a path towards reducing greenhouse gas emissions.

Fig.1. List of Eligible Activities for classification as CC mitigation financing, applicable to buildings.

Source: **2017 Joint Report On Multilateral Development Banks' Climate Finance**

3.3. Renewable Energy

Eligible activities for the category of renewable energy (RE) may arise from the generation of energy or the use of renewable energy, such as heat production. It is important to keep in mind that it is possible to use RE generated in the same project or to use energy from a renewable source that is not part of it.[10]

10 If the RE is generated within the framework of the project, the cost of installing the technology (for example, a solar panel system) is counted as FC. However, if the project is connected to a network whose source is ER, only those costs generated to connect to the existing network can be accounted for.

Power Generation

The project could include the generation of RE for its use or even share a surplus with other buildings or with the community itself. In the buildings, it is possible to incorporate:

- Wind Energy: installation of mini or micro wind systems.
- Solar energy: installation of photovoltaic systems.[11]
- Hydroelectric energy: installation of mini or micro-hydroelectric systems.

The use of renewable energy can be considered for the totality of the building or for some specific sectors, as, for example, to provide exterior lighting or for the use of an specific equipment.

11 For more information, it is advisable to consult the document **+ SUN + LIGHT: Practical Guide for the Implementation of Photovoltaic Systems in Social Infrastructure Projects (IDB, 2018).**

Heat Production or Other Uses of RE.

The project can count on heat-generating systems that benefit from the incorporation of renewable energy for other use.

It includes:

- Water heating by solar radiation, for use in toilets or kitchens.
- Heating obtained by solar radiation, using air or water collectors.
- Installation of systems to provide heating in the winter and cooling in the summer, using geothermal energy.
- High-temperature steam generation for energy production.
- Wind-driven pump systems.
- Installation of efficient and improved biomass greenhouses.
- Installation of heat storage systems, which allow the heat to be captured during the day to heat up at night and to deliver enough heat outside during the night to keep it fresh during the day, exploiting temperature changes between the day and night cycles.

3.4 Energy Efficiency

The application of energy efficiency measures in buildings, as a whole or in an isolated manner, generates energy savings during the operation of buildings and its equipment when compared to traditional buildings, which translates into savings in economic resources.

Readjustment *(Retrofit)* of Existing Buildings

The possibilities of incorporating measures to improve energy efficiency in existing buildings are more limited than in new buildings. Even so, it is possible to do so working mainly on three aspects:

a) Improvement of energy efficiency in lighting, appliances, and equipment.

The most common actions include:

- Replacement of appliances and equipment[12] with lower efficiency and lifespan[13] for others with high energy efficiency, preferably those with energy classification A+, A++ and A+++.
- Replacement of lighting equipment with lower efficiency and lifespan with high efficiency and long lifespan (LED) equipment in indoor and outdoor spaces.
- Installation of occupancy sensors in indoor areas and photoelectric sensors in outdoor areas.
- Installation of thermostats for users to regulate the temperature in each room.
- Replacement of storage type water heaters, by passage type water heaters.
- Installation of monitoring and control equipment for energy-intensive consumption equipment.
- Installation of water-saving devices, to reduce energy consumption by pumping drinking and wastewater.

b) Replacement of heating/cooling systems of existing buildings with cogeneration plants that produce electricity using the heat generated to provide heating.

We refer to cogeneration when electrical energy and useful thermal energy are obtained simultaneously, in the form of steam or hot water, or tri-generation, when in addition to electrical energy and heat, cold is also available for cooling. These systems are advantageous when a high demand for energy is combined with a high demand for thermal energy (for example, in a hospital that, in addition to high energy demand, requires heating and/or cooling).

12 The equipment that consumes the most energy are the engines used in water pumps, elevators, industrial equipment, among others.

13 As long as the replacement takes place before the end of the useful life of the device to be replaced. That is, when it is not a replacement due to rupture.

c) Readjustment of existing buildings: architectural or construction changes that allow reduction of energy consumption (specifically in air conditioning systems).

It may include:

- Use of reflective paint/reflective tiles for ceiling and exterior walls.
- Use of thermal insulation of the roof, external walls, windows, and existing doors.
- Reduction of the proportion of glass in the exterior facade.
- Use of external protection such as parasols and/or other elements, including vegetation,[14] that generates shadow and reduces sun exposure, especially in the summer.
- Installation of low emissivity glass and/or high-performance glass.
- Architectural changes in accordance with bioclimatic design strategies, which guarantee, for example, natural ventilation with operable windows.
- Installation of ceiling fans.
- Installation of rainwater collectors for use in toilets or irrigation systems.[15]

It is important to consider that, to achieve efficient results, the use of these measures requires coordination and coherence among them, since a building is an integral unit and not just the sum of isolated measures. For example, the type and thickness of thermal insulation will depend on the orientation and temperature conditions of the site it is located.

14 It is suggested the use of *Xeriscaping*, a landscaping style that reduces or eliminates the need for supplementary irrigation, for example, using plants native to the region in which it is applied, using improved soil to conserve water, reducing grassy surfaces.

15 The provision of water represents a significant expenditure of energy and one of the major causes of GHG emissions. The measures that drive the collection or saving of water contribute to reducing the energy demand due to pumping for their provision and treatment.

Design and construction of new buildings

In the case of new buildings, the possibilities of incidence in the design are higher than in that of existing buildings, since it can influence even the location of it. In that sense, it is possible to opt for an architectural design that seeks to achieve high energy efficiency and use construction techniques that reduce energy consumption, exceeding the national standards available in traditional construction and/or complying with certification or energy efficiency rating schemes. Additionally, new buildings can have specific characteristics to facilitate the incorporation of renewable energy systems, since their inclusion can be thought from the conception of the architectural project.

This architectural design is commonly defined as “sustainable architecture” (also called sustaining, bioclimatic, green, eco-architecture), and consists of the design of buildings taking into account local climatic conditions, seeking to benefit from the positive aspects of the climate in which it is inserted, taking advantage of available resources (sun, vegetation, rain, winds) to protect the building against inclement aspects, to reduce environmental impacts, and to try to reduce energy consumption.

Therefore, the first step to define the best strategies for the incorporation of energy efficiency measures is to study the conditions of each site carefully, mainly analyzing the following elements:

- Climate and microclimate (temperature, days of heating, solar radiation, sun, humidity, prevailing winds, rainfall, cloudiness).
- Environment conditions (topography of the territory, endemic vegetation, heights of adjoining buildings).
- Availability of local materials.

Once the context in which the property is inserted is studied, it is possible to define passive and active strategies to be incorporated into the design. Passive strategies seek to take advantage of the climate and to minimize its disadvantages by reducing energy demand, while active strategies seek to act on technological elements to be incorporated into the design.

Passive strategies include the following aspects:

- The orientation of the building: a "bad" orientation can lead to an increase of up to 70% in the energy demand of a building. Therefore, it is essential to orient the buildings and their main facades adequately, and also take advantage of these conditions for rooms that can benefit most according to the activities carried out in it and the hours in which they will be used. For example, in cold weather in the southern hemisphere, it is advisable to orient the building and to locate the most used rooms to the north, to take advantage of solar radiation for most of the day, ensuring that the main rooms are the hottest and brightest, and locate service, warehouses, etc. to the south, since they will be darker and colder.
- Form factor: the volumetry of a building can also respond to the weather since it affects heat dispersion. For example, in cold climates, it is advisable to prefer compact buildings since they facilitate the conservation of heat by reducing surfaces exposed to the outside, while in hot and humid climates it is advisable to prefer dispersed (or non-compact) buildings, since they facilitate dispersion of heat through ventilation.
- Conditions of sunlight and sun protection: in general, it is important to take advantage of solar radiation in winter, and to seek protection from solar radiation in summer to reduce the use of thermal conditioning systems. It is possible, for example, to incorporate oriented parasol elements in order to protect from radiation only in the summer, when the sun is higher, or use deciduous vegetation, which allows the walls to radiate in winter, and protect them with their foliage in the summer.

- Cross ventilation: it can facilitate the cooling of a building and renovation of indoor air, and contribute to increasing internal humidity, as long as water bodies (fountains, water mirrors, wetlands, among others) are included in the areas outside the building. It is possible, for example, to install windows on two opposite facades of the same room.
- Thermal insulation on facades and roof: prevents heat loss in winter and heat entry in summer. It is possible to use a wide range of insulating materials on walls and ceilings, including some ecological options such as cork, linen or cellulose.
- Vegetation: helps provide shade and moisture or protect from cold winds and improve indoor air quality. Depending on the specific requirements, green vegetation can always be used to protect walls exposed to strong winds, for example:

Once the building has been passively worked to reduce energy demand, it is possible to use **active strategies** to respond to the remaining energy demand, incorporating in the projects systems that provide renewable energy (see section 3.3) and including energy efficiency measures (see section 3.4).

As in the case of retrofitted buildings, to have efficient results, the use of these measures (both passive and active) requires coordination and coherence among themselves since a building is an integral unit and not just the sum of isolated measures. In addition, it is essential to take into account that one measure may be beneficial for one aspect, but counterproductive for another. For example, large glazed surfaces may be beneficial to reduce the need for artificial lighting during the day, but be counterproductive to reduce dependence on air conditioning systems. Therefore, a specialist must analyze the measures as a whole.

3.5 Agriculture, Forestry and Land Use

Afforestation (plantations) and agroforestry in non-forested lands

The integration of vegetation into building projects, both in urban and rural areas, helps to capture GHGs. In urban areas, especially, it helps to improve air quality, to regulate temperature and humidity reducing the heat island effect, and it contributes to increase the filter surface, favoring the filtration of water in the subsoil. Depending on the magnitude and type of buildings, they can include:

- Roofs, walls, and green terraces.
- Tree-lined gardens and orchards.
- Dry gardens.

3.6 GHG reduction by other non-energy sources

Air conditioning and refrigeration

It is possible to intervene in the readjustment of existing industrial, commercial, and residential infrastructure, changing the cooling agent to one with a lowest global warming potential (GWP), seeking to exceed national standards. This applies in the case of buildings that have centralized air conditioning systems. It is suggested to analyze the cooling agent used and its level of harmfulness to the environment, to replace it with gases with lower GWP.[16]

16 It is important to review local regulations, as they may differ among countries.

3.7 Waste and Wastewater

Wastewater

The provision of water, as well as the treatment of wastewater, represent a significant expenditure of energy and one of the major causes of GHG emissions. For this reason, the following measures applicable to buildings can contribute to the reduction of emissions and be accounted for as FC:[17]

- Separation of black wastewater from gray wastewater.[18]
- Installation of gray water purification systems - mechanical (sand filtration, volcanic rock filter systems, among others) or biological purification systems (treatment systems with plants and artificial wetlands, among others) - for its reuse in toilets, irrigation of gardens and plants.

17 According to the Joint Methodology, the measures can be accounted for only if the net GHG reduction can be demonstrated and if there is no compliance requirement such as a performance standard or safeguard requirement.

18 The gray wastewater is the one that come from washing utensils and clothes, and from bathing.

Solid waste management

In the case of buildings, the activities that can be accounted for as FC are:

a) Projects to convert waste into energy:

- Installation of anaerobic biodigesters to manage the organic fraction of household solid waste and other assimilable waste. The biogas generated by the biodigesters must be captured and used (for example, as cooking gas) and/or burned in a controlled manner. The digestate[19] could be used, as long as it is confirmed that the applicable legislation allows it.

b) Recovery, recycling, and waste management projects that recover or reuse materials and waste as inputs in new products or as a resource (only if net emission reductions can be demonstrated):

19 Digestate is a byproduct of the biodigester, which can be used as a fertilizer.

- Recovery of buildings or portions of existing buildings for new uses.
- Reuse of construction materials from existing buildings.
- Use of construction materials that are reusable after the end of the life cycle of the property for which they were used in the first place (i.e., wood and metals).
- Development of a waste management policy at the construction site.
- Installation of differentiated containers for the separation of solid waste (which allows, apart from the logistical benefits, to minimize the risk of inappropriate disposal; for example, fractions of infectious and non-infectious waste in hospital premises) and inclusion of suitable places for the temporary storage of it in buildings. Waste should later be recycled (as far as possible) by organizations, companies, and/or recycling centers.
- Installation of manual composters[20] for the management of separate organic waste and compost/compost production.

20 Container where the deposited organic matter decomposes in order to obtain an organic fertilizer (compost) used as a natural fertilizer.

3.8 Transport

The projects can contribute to facilitating the use of non-polluting means of transport, which indirectly contribute to reducing emissions due to the use of motorized transport:

- Location of buildings in urban areas served by public transport and/or reachable on foot, compared to a peri-urban location attainable only through individual motorized transport.[21]
- Installation of specific spaces in buildings to facilitate the use of bicycles, such as parking lots and warehouses.
- Provision of pedestrian accesses for buildings, to facilitate pedestrian mobility.
- Installation of charging stations in parking lots, to facilitate the use of electric vehicles.

21 In this case, the additional cost of acquiring land located in the central area could be measured, compared to the cost of land of the same size in the peri-urban or peripheral area.

3.9 Low-carbon technologies

Projects can contribute to research and development on low-carbon technology by studying new applications of renewable energy for buildings, construction systems that guarantee high levels of energy efficiency, for example. Aditionally, they can contribute to it by creating strategies to reduce the amount of materials used in the construction, innovations in the manufacturing process, transportation or disposal of construction materials, among many others.

3.10 Cross-cutting Issues

Beyond buildings, other sectors can contribute to climate change mitigation by support to national, regional, or local policies, or through technical assistance or loans. Among these options, these are highlighted:

- The promotion of appropriate construction codes.
- Design of building authorization standards that incorporate CC measures.
- Standardization and labeling of high energy consumption equipment.
- Certification of specialists in energy efficiency in buildings.
- Development of video games and other virtual tools that simulate current conditions and its changes, to determine their effect on mitigation.

In the case of education projects, for example, we can also highlight:

- Inclusion of the topic of CC and environmental sustainability in school curricula.
- Organization of events and awareness days on adaptation and mitigation to CC.
- Promotion of policies and normative activities for the inclusion of renewable energies in schools.
- Training users of buildings on the use of resources (water and energy), waste management, maintenance of renewable energy generation systems, among others.

3.11 Others

The choosing of construction materials can also contribute to the reduction of GHG emissions. Different construction materials have energy and environmental impacts determined by different factors, among which are the manufacturing and transportation process. For the choosing of materials, it is important to consider the following:

- Materials found and produced locally allow to a significantly reduction of emissions, through their transportation from the production area to the project site;
- Materials have built-in energy,[22] calculated throughout their life cycle, from their production to the treatment of debris. The use of materials with the lowest energy content reduces GHG emissions.
- Recycled materials also contribute to the reduction of emissions since the recycling process produces energy savings.

22 Built-in energy, also called gray energy or captive energy, means the amount of energy consumed in the life cycle of a product, material or service.

4. Adaptation measures to climate change

This chapter describes the Joint Adaptation Methodology and includes detailed examples of adaptation measures to the CC that can be incorporated into Bank projects include building design, improvement, and construction.

4.1 Joint Methodology for Financing Adaptation to CC

The Joint Adaptation Methodology[23] uses an approach directed to the context and location of the project, since the adaptation measures to the CC are strictly linked to the local context in which they are implemented, and considers only the disaggregated elements deemed relevant, identifying those specific adaptation activities within the operations.

The Joint Adaptation Methodology is based on Common Principles and Key Steps, which establish that the FC to be accounting for adaptation applying to the following cases:

23 See Annex B of the document **Joint Report On Multilateral Development Banks' Climate Finance**

a. Activities that respond to the current and expected effects of CC, when such effects are important for the context in which they are intended to be applied.

b. Activities that are part of independent or multiple projects, or components, subcomponents or elements of the project, including those directly aimed at CC adaptation that was financed through intermediaries.

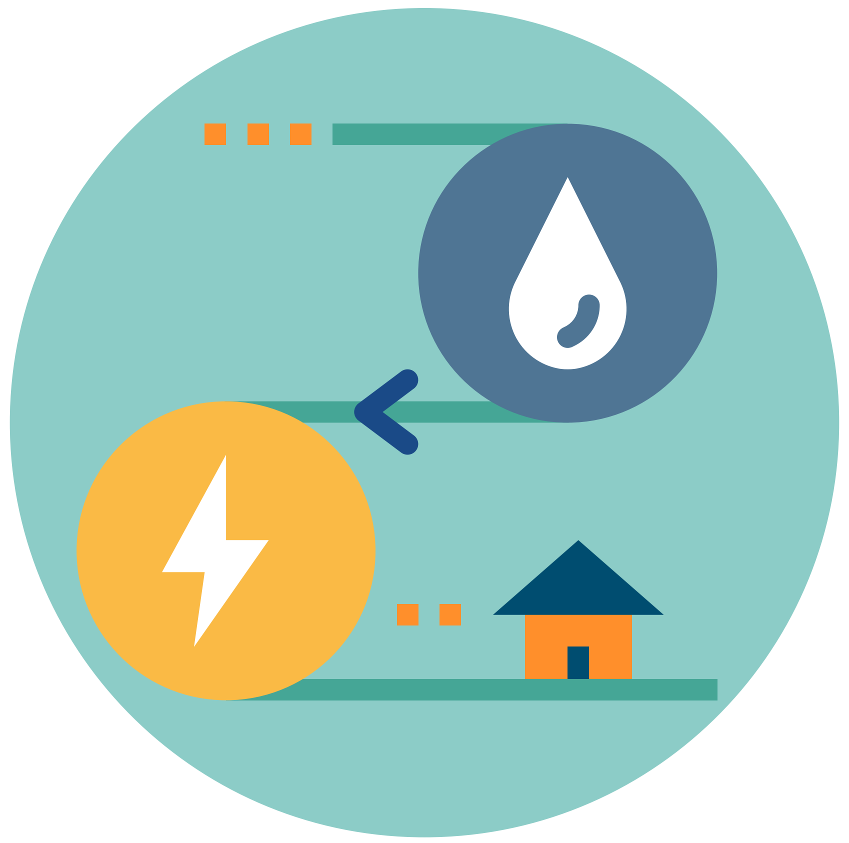
c. Projects that include a description of the activities to be accounted for as FC, in accordance with the following three Key Steps:

1. **To describe the context of vulnerability to CC where the project is inserted.** For example, it should be mentioned that the buildings to be built are located in an area where it is expected to have more droughts due to climate change.
2. **To include among the goals of the project, or any of its activities, that it will contribute to reducing vulnerability to CC.** For example, it should be said that buildings seek to adapt to CC through the implementation of water efficiency measures.
3. **To specifically elaborate the activities through which the project will be adapted to the climate risk identified in point 1**. The activities identified for adaptation to CC must be concrete and directly related to a situation of identified and sustained vulnerability. For example, in a drought scenario, promote the installation of rainwater collection systems, water recovery systems, showers and low flow faucets, double discharge toilets, among others.

d. To the extent reasonably possible, adaptation activities should be disaggregated as such. If a disaggregation is not possible using the project data, a qualitative evaluation can be carried out or the experience of other projects can be used to identify the proportion of the project that covers climate change adaptation activities, per the principle of conservatism.

It is important to bear in mind that all those studies that are carried out to choose the location of a building, within the framework of the project, can be considered adaptation actions to CC, as long as the studies demonstrate to consider CC in the analysis. In that case, in order to account these resources as CC, the study should follow the three-step logic: justify the vulnerability of the project; make explicit that it will seek to respond to this vulnerability; and explain how the study will respond to vulnerability.

If there is not enough space in the POD to add this information, it is suggested to add an Optional Technical Annex, as described in Annex I of these Guide.



4.2 Adaptation Measures to CC

The following sections include examples of adaptation measures to CC that can be incorporated into construction projects. Considering the activities that contribute to CC adaptation to be directly related to the specific context in which the buildings are inserted, only some of the examples that respond to the most frequent CC phenomena in the region will be provided.

It is important to note that the scenarios that buildings may face can vary, the specific goals of the CC adaptation measures also vary. For example, incorporating water efficiency measures into a building, a good practice in any context, is only considered as an adaptation if the building is in a location where droughts are expected to increase due to climate change. For that reason, it is important to study in detail the context of vulnerability and CC scenarios of the specific location since the same measure can be considered as an adaptation in one place and not in another.

These sections are not intended to be exhaustive, but exemplary of some possible measures applicable to the general context of Latin America and the Caribbean.

Context 1.

Drought and Water Scarcity.

In a context where water is a scarce asset due to CC and/or projections indicate desertification processes, strategies for reducing water use and water treatment can be applied in buildings, as follows:

- Installation of a rainwater collection and treatment system for use, for example, in irrigation or sanitary discharges.
- Gray water treatment systems for use, for example, in irrigation or sanitary discharges.
- Blackwater treatment systems for use, for example, in irrigation or sanitary discharges.
- Installation of showers and low flow faucets for kitchens, sinks, and bathrooms.
- Installation of double discharge toilets.
- Recovery of condensed water from equipment.

Context 2.

Sea Level Rise, Floods, Increased Rainfall, and Storms.

In a context where the scenario foresees an increase in heavy rains, sea-level rise, the occurrence of hurricanes, and floods due to CC, the following strategies can be implemented:

- Improvement in drainage systems in the construction site.
- Increased capacity to collect and treat rainwater for reuse.
- Elevation of the level of the ground floor in new buildings in vulnerable areas.
- Protection against floods, river undermining, avalanches or landslides generated by heavy rains, through retaining walls, embankments, dikes, among others.
- Use of materials and construction systems resilient to rain, floods, strong winds, etc.
- Use of permeable pavements.
- Installation of green roofs or other flood and/or permeable green areas.
- Design of outdoor spaces that include flood areas (squares, gardens, among others).
- Architectural changes to transform public buildings into shelters in case of disaster.
- Relocation of a building located in an area at risk of flooding to a safe area.

Context 3.

Temperature Increase.

In a context where the scenario foresees an increase in temperatures due to CC, the following strategies can be implemented:

- Design and/or architectural changes that guarantee natural cross ventilation.
- Installation of sun protection and sun control measures on the facades, such as the use of shading vegetation, parasol elements *(brise-soleil)*, etc.
- Installation of thermal insulators in walls and ceilings.
- Use of reflective paint/reflective tiles for ceiling and exterior walls.
- Use of reflective glass or with low heat transmission capacity.

5. Climate Financing Accounting

As mentioned earlier, the CSD/CCS is the division responsible for carrying out the calculation of the FC using the Joint Methodology of the MDBs. However, for the CSD/CCS to calculate the percentage of the resources of an operation that can be classified as FC, it is necessary to include information and justification in the project preparation documents (POD and/or its annexes). For this, it is important to include the details of the mitigation and/or adaptation activities[24] that will be incorporated into the project, as well as the cost estimates of these activities and their impact on the total project budget.

The following describes how, based on the information provided by the project team, the CSD/CCS calculates the FC in buildings.

24 In the case of adaptation, it is important to follow the three steps described in section 6.

- **The cost of the mitigation and/or adaptation measure(s) implemented in a building (new or retrofitted) is explicitly accounted** when the explanation of the measures(s) is included in the POD or its annexes and that information allows to estimate the costs. For example, if the project proposes to place LED bulbs in a school, the cost of them is counted as FC; or if it is planned to place a thermal insulation on the facade of a hospital and also put water-saving faucets and toilets with double discharge in the rooms, the cost is counted as FC. If, at preparation phase, the architectural designs (plans and/or technical specifications) are not yet available and therefore does not have the exact definition of the measures to be included in the infrastructure and detailed budgets thereof, it is possible to verify the available options and estimate their costs through online tools. These tools can guide the decision-making process. EDGE, for example, helps to identify, free of charge, the most costefficient measures and allows calculation of additional costs and the period of investment return, adjusting the values according to the type of building and the city in which the building is located.

- **100% of the cost of design and construction or renovation of a building is accounted for** when the POD or its annexes show that mitigation and/or adaptation measures are being incorporated into a building and one of the following criteria is met:
    - The building will be certified as a "green building" (including aspects of CC) by accepted or recognized national or international standards.
    - The building meets all the minimum requirements to obtain a certification with accepted national or international standards, even if it is not certified.

For example, if you plan to build a new health center or readjust an existing one that will be certified as EDGE,[25] the total cost for the design and construction or renovation is counted as FC. Likewise, if a health center is planned to be built, and measures that will save 20% of water, 20% of energy and 20% of built-in energy in materials will be installed (which are the criteria requested to be able to certify as EDGE), the total cost of its design and construction is accounted for as FC.

25 *Excellence in Design for Greater Efficiencies* (EDGE) is a certification of "green buildings" developed by the IFC that requires that buildings save 20% in energy, 20% in water and 20% in energy of materials compared to a conventional building.

- **100% of the cost of design and construction or renovation of a building is accounted for** when the POD or its annexes proves that highly efficient construction techniques or architectural designs will be used for the construction or renovation of a building. One way to prove this is through scientific articles that explain how a specific architectural design or construction method reduces GHG emissions or saves water and/or energy when compared to commonly used construction designs or methods.

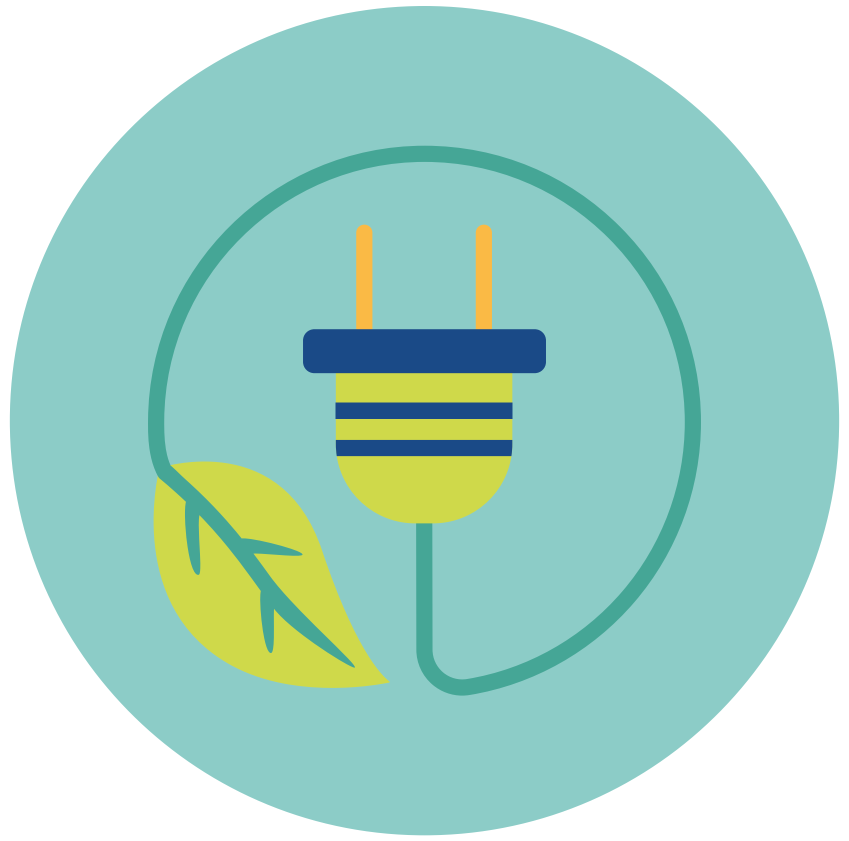
There are some examples to clarify how to describe these activities in the project documents in the following page.

Example 1.

HO-L1195 - Project for Management Improvement and Quality of Maternal and Neonatal Health Services, Honduras, 2018. Division of Social Protection and Health. (Amount Invested by the IDB: US$ 69 million)

This operation's goal is to contribute to the reduction of maternal-neonatal mortality in the poorest municipalities of the country in prioritized hospitals. It includes aspects related to CC in the component of improvement of health services equipment and infrastructure. In particular, the POD mentions those specific measures that will be applied in hospitals, and that will contribute to improving energy efficiency in buildings, mitigating the effects of CC.

In this case, it was estimated that around 8.01% of the total financing of the operation was invested in climate change mitigation activities.



Component 2: Improvement of Health Services Equipment and Infrastructure (US$ 28.89 million).

To improve the capacity of health facilities and hospitals, the following will be financed: (i) construction and equipment of three neonatal intensive care units in general or type 2 hospitals; (ii) expansion and equipment of the neonatology rooms of the university school hospital; (iii) construction and equipment of obstetric-neonatal rooms in two basic hospitals and in a general hospital [...].

In hospital construction work, measures will be included to mitigate the effects of climate change and energy savings, such as: (i) elevated floor-to-ceiling construction to take advantage of air circulation; (ii) use of special paint on the roofs outside and insulating material on the inside to insulate heat and reduce air conditioning consumption; (iii) use of high energy efficiency equipment for both air conditioning and lighting; (iv) in lighting, LED equipment will be used; and (v) the incorporation of photovoltaic autogeneration will be analyzed.

Fig.2. Extract from Loan Proposal HO-L1195

Example 2.

AR-L1260 - First Operation of the Program of Urban Integration, Social and Educational Inclusion of the Autonomous City of Buenos Aires, Argentina, 2017. Divisions of Urban Development and Housing, and Education (Amount Invested by the IDB: US$ 100 million)

This operation aims to contribute to: (i) the integration of Barrio 31 (B31) by providing urban infrastructure, quality social equipment, and improving the habitability conditions of homes and businesses; and (ii) the improvement of the quality and educational equity of the Autonomous City of Buenos Aires, expanding access to new educational toolsand strengthening management and evaluation systems; it includes the theme of CC in several of the components.

For this project, 64.55% of the total amount of the operation has been estimated as FC, of which 63.5% is due to mitigation and 1.05% to adaptation.

Regarding the amount for mitigation, the total amount of resources invested in the design and construction of the Educational Complex (subcomponent 1.1) and the specific energy efficiency measures in housing (subcomponent 1.3) were considered as FC. It should be noted that when mentioning that the Educational Complex to be financed with the program would obtain an EDGE certification, to ensure that it is “green” as a whole, it was not necessary to detail the specific measures that would be incorporated into the building.

Concerning the amount of adaptation, those measures in public and green spaces focused on increasing permeability and controlling temperature, part of the urban infrastructure interventions of subcomponent 1.2, were considered.

Subcomponent 1.1. New Educational Complex (US$ 63 million). [[...] Finances an Educational Complex of approximately 30,000m2 in B31 including: (i) three schools [...]; and (ii) a headquarters for the Ministry of Education [...]. The Educational Complex incorporates measures of energy efficiency and sustainable management of natural resources and will be certified by the ***Excellence in Design for Greater Efficiencies*** (EDGE) or similar certification.

Subcomponent 1.2. Urban Infrastructure (US$ 14.5 million). Its goal is to contribute to the habitability of B31 through the development of urban infrastructure resilient to climate change. It finances: [...] the execution of construction work for the development of approximately 18,000m^2 of public and green spaces around the Educational Complex to provide quality meeting and recreation places for the residents of B31, which in turn contribute to increasing the permeability and control the temperature of the sector.

Subcomponent 1.3. Housing and Business Improvement (US$ 7 million). Its goal is to guarantee durable and safe structures with adequate spaces to live and work. It finances the formulation of plans, executive projects, technical assistance, and execution of construction work for the renovation and exterior improvement of approximately 550 homes and businesses in the B31. The qualitative deficit of these structures related to their accesses, facades, insulation, ceilings, terraces, terminations, and other external elements is addressed. [...] Design elements for mitigating and adapting to climate change related to the application of energy efficiency technologies and green roofs are incorporated, according to their feasibility.

Excellence in Design for Greater Efficiencies (EDGE) certifies the reduction in energy, water,built-in energy of materials and CO_2 emissions when compared to a building constructed according to conventional techniques.

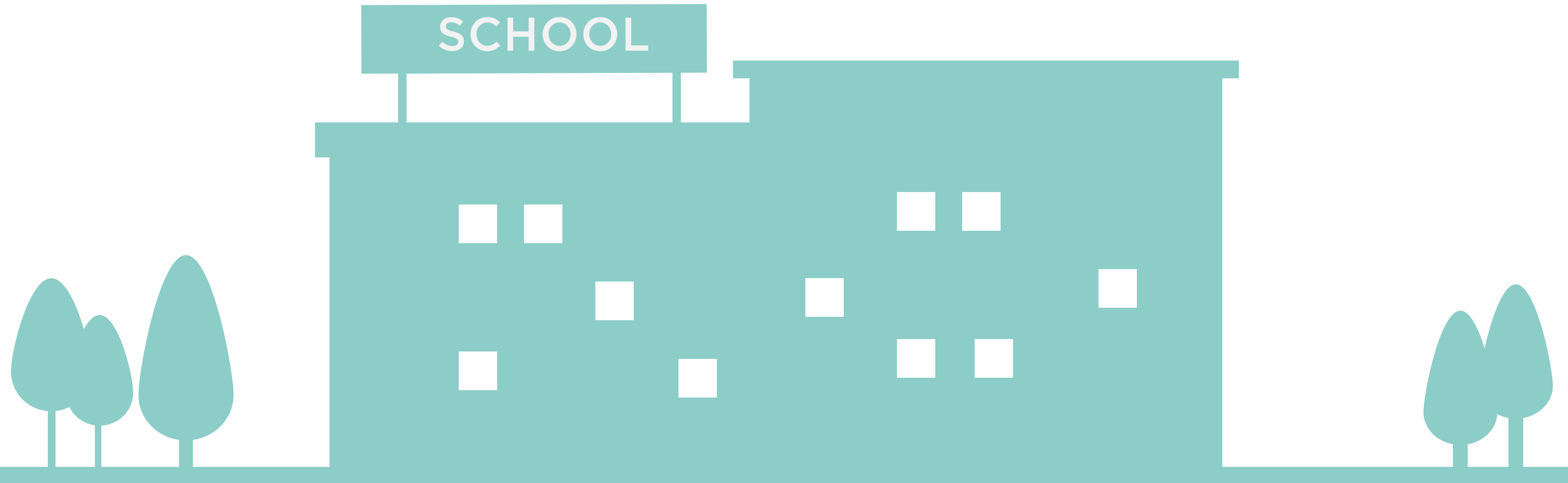
Fig.3. Excerpt from Loan Proposal AR-L1260

Example 3.

AR-L1254 - Program to Support the National Plan for Early Childhood and the Policy of Universalization of Initial Education, Argentina, 2016. Divisions of Education, and Social Protection and Health. (Amount Invested by the IDB: US$ 200 million)

This operation, which focuses on increasing the coverage of public services aimed at promoting the development of children from 0 to 5 years, includes a subcomponent that finances the expansion of educational infrastructure (Subcomponent 2.1: Expansion of Educational Infrastructure US$ 105.8 million). In this case, the use of "bio-environmental designs" for kindergardens is briefly mentioned in the POD. However, since more detail is required for accounting for FC, a technical annex[26] explaining how these designs contribute to CC mitigation and how they can be attached to the package, describing in detail the energy efficiency measures and estimating the volume and cost of saving energy and water, and the reduction of GHG.

In this case, the total amount (corresponding to 49.2% of the amount of the operation) of the resources invested in the design and construction of the kindergardens, part of Subcomponent 2.1, was considered as FC for mitigation. The attached technical study demonstrates clearly that the building project would be designed and built with a bioenvironmental approach, which exceeds national standards, when compared to buildings built with traditional techniques.



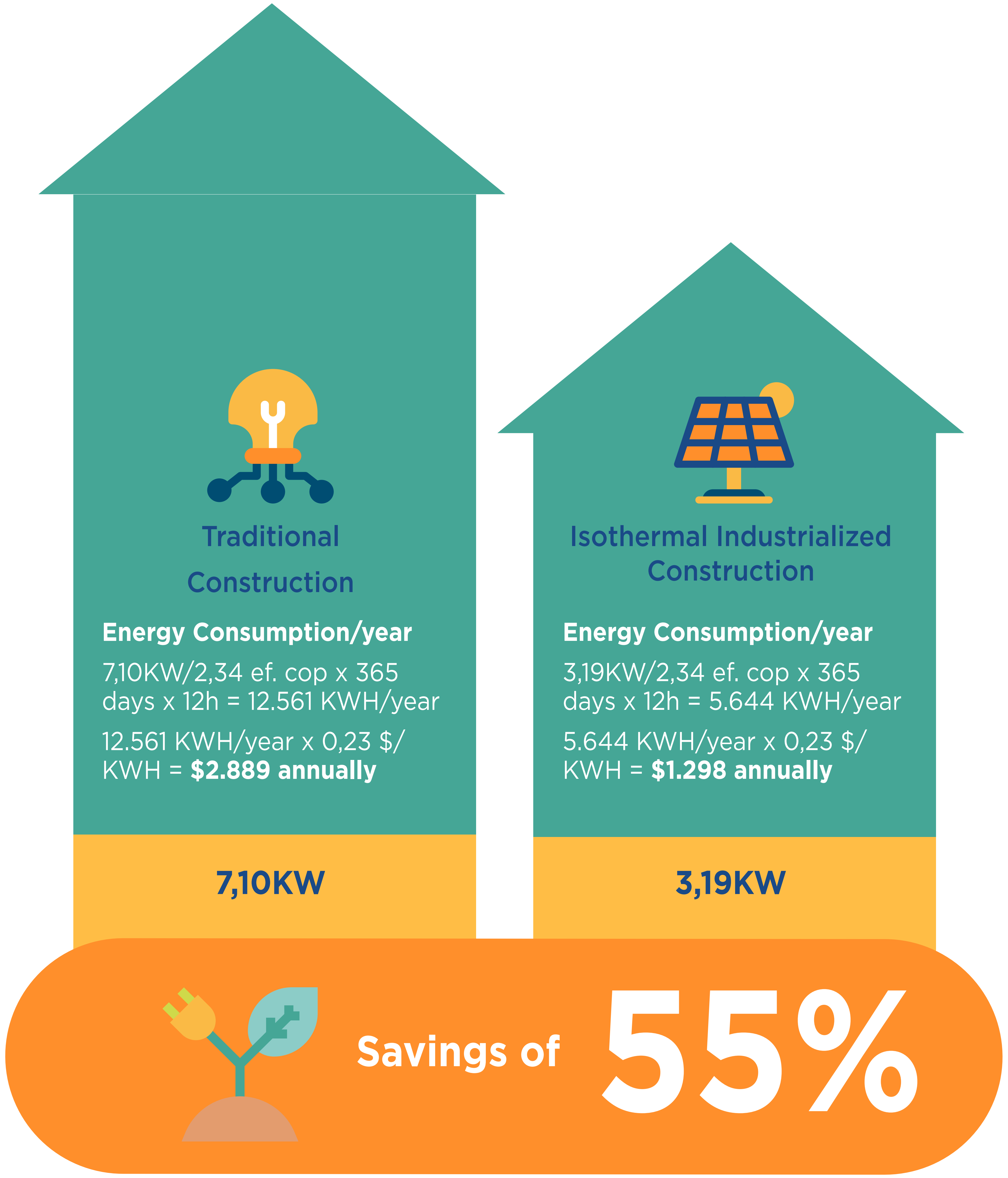
26 When information is available on the measures to be included in the project, but not enough space is available in the main POD document, it is possible to include an additional technical annex that describes in detail all the measures that the project seeks to incorporate. The structure of the annex will vary depending on each specific case; the CSD/CCS teams and the Social Infrastructure Unit will be able to support the definition and elaboration of the same. Annex I of these Guide provide guidance on the information to be included in this annex.

Strategic alignment. [...] It is also aligned with the cross-sectional area of CC, since the kindergardens will be built with a bio-environmental design, under the dry prefabricated method. Approximately 49.2% of the resources of the operation will be invested in mitigation activities to the CC, according to the Joint Methodology of the MDBs for the estimation of FC.

Subcomponent 2.1. Expansion of the educational infrastructure. Its goal is to expand coverage in initial education through the expansion of school infrastructure. Specifically, it will finance: [...] (ii) the construction or expansion of 98 kindergardens (out of these, 10 with innovative learning models) and furnishing in the PBA; [...]..

Technical Annex: [...] The kindergartens to be financed with the loan include a dry-built industrialized construction system, which has not been used so far in construction works financed by the Ministry of Education and Sports. The main reason for this decision is that these systems are very sustainable, contemplating a rational use of energy and having half the term of execution than traditional construction work. These significant advantages, in comparison to traditional construction systems, nevertheless have a higher cost/m2, which is offset by the energy savings that are obtained throughout its useful life and also because when the execution period is shortened, the adjustment of the final value of the contract with price redetermination also decreases.

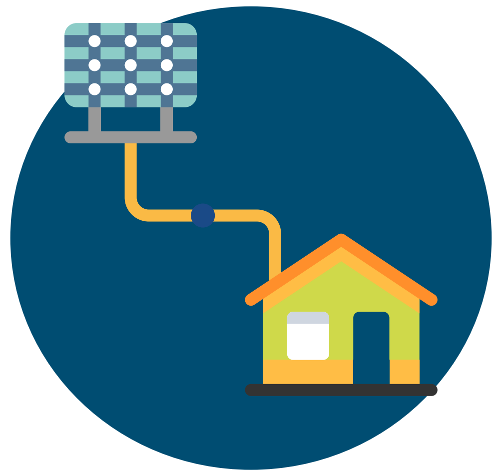
Fig.4. Excerpt from Loan Proposal AR-L1254 and the Technical Annex



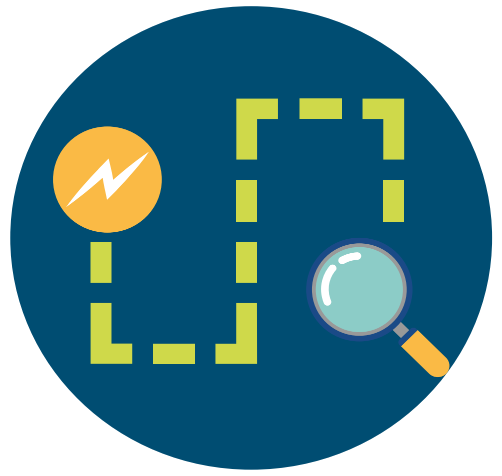
6. Conclusions

The Bank's loan-financed building projects have great potential to help address global climate challenges.

These Guide present a variety of possible options for measures that can contribute to mitigation or adaptation to CC, providing a basic description of them. These Guide are not intended to be exhaustive, but to list and exemplify some of the possible measures applicable to building construction in the general context of Latin America and the Caribbean.



It is important to note that the applicability of one or another measure will be determined by specific technical studies that analyze which are the most appropriate according to the context, requirements, and budget available for each project. Likewise, these Guide are not intended to replace the specific technical advice that any infrastructure project requires, but to provide, in general lines, an overview of the numerous possibilities that buildings have and to give indications on how to describe these measures in the documents of the Bank's project.



Both the Climate Change Division and the Social Infrastructure Unit have technicians to advise project teams and borrowing countries on how to incorporate technical measures that improve the possibilities of mitigation and adaptation to the CC on their building infrastructure projects.

The integration of these measures into the projects helps to improve their quality and to face global climate challenges, thus contributing to the achievement of the Paris Agreement. These measures, if correctly indicated in the Bank's operations documents, can be accounted for as FC, contributing directly to the fulfillment of the goal that 30% of the financing of the IDB Group operations approved by 2020 be counted as FC.

Annex I: What information should be included in the Optional Technical Annex?

When there is relevant information regarding the interventions in the projects related to climate change, but there is not enough space to describe them in the main document (POD), an Optional Technical Annex can be added. As a general guideline, it is suggested to include the information described in the following paragraphs. However, the specificities of each project may require different information.

The information described in the first three points follows the logic of what is indicated in Chapter 4, for cases of adaptation. However, it is suggested to use this model also for mitigation cases, as it facilitates the understanding of the project and the proposed measures/strategies.

1. Description of the context of vulnerability to climate change and climatic conditions

This section aims to show the existing conditions and vulnerabilities to ensure that the proposed measures respond adequately to these conditions.

a) In the case of an adaptation, it is important to highlight the scenarios of vulnerability that buildings can face due to climate change effects.

Example: Paramaribo has a tropical rainforest climate, under the Köppen climate classification. The most important elements that should be carefully considered in the tropical climate are the design of the building exterior, the cooling technology, and the efficiency of the appliances, all crucial factors in reducing energy consumption.

Fig.6. Excerpt from the Technical Annex of SU-L1054

b) In case of mitigation, it is important to explain the climatic conditions of the place where the buildings are going to be inserted, to show which are the aspects that are mostly affected.

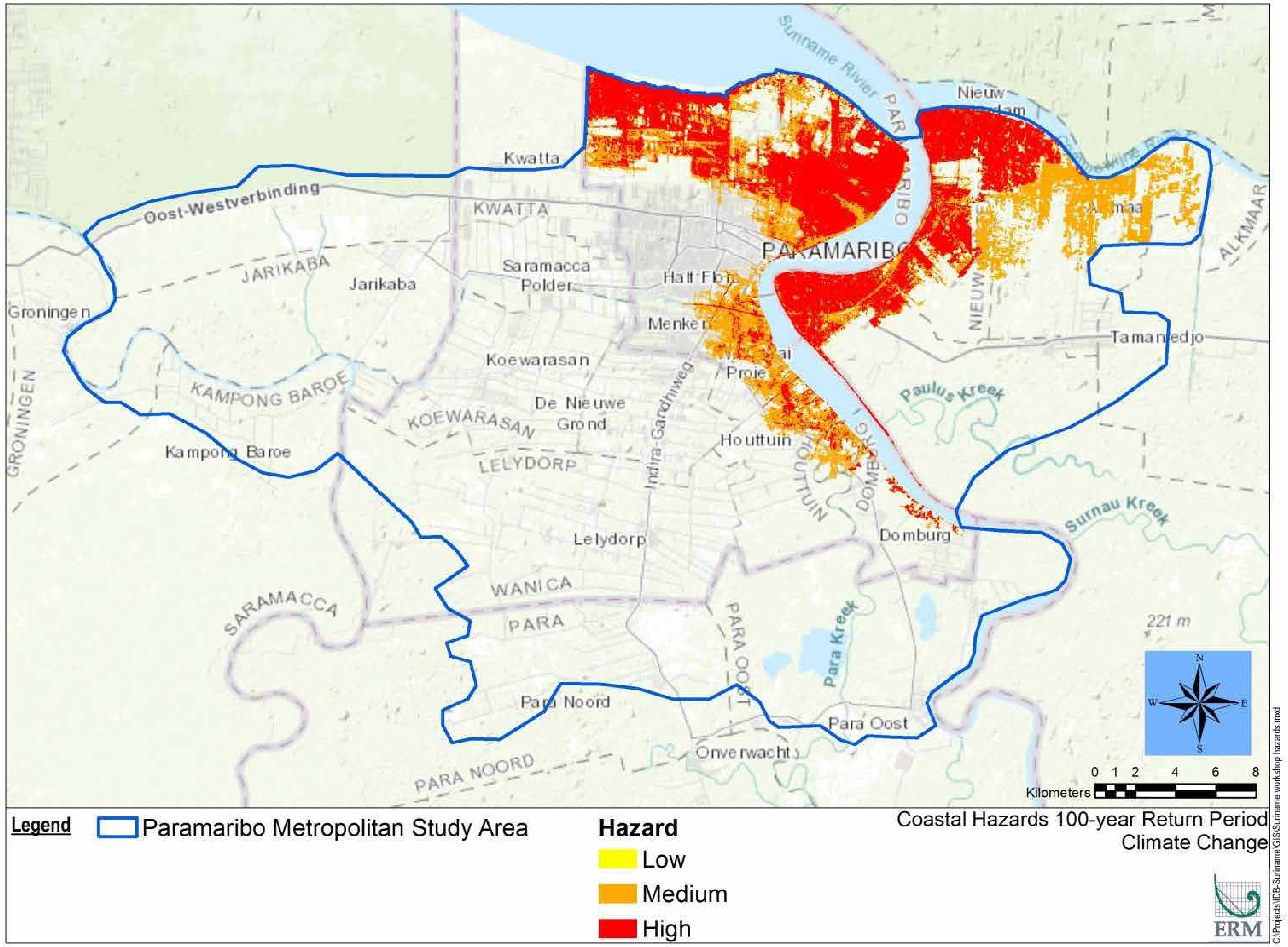
Example: "Suriname is very vulnerable to the effects of climate change (CC), specifically due to river and coastal flooding, and has already suffered heavy losses and damages. The rise in sea level represents a significant development challenge for the future of a country with almost 30% of the land, including the capital city, located just a few meters above sea level. The impacts are projected to affect more than 40% of the country's GDP and the well-being of more than 80% of its population, including Paramaribo residents.

So far, Suriname has had to carry out adaptation interventions and develop climate resilience, while discussing whether to continue investing heavily in adaptation or relocating and rebuilding its entire economy away from the threat of sea level rise.

In this sense, the decision to relocate all the facilities of the Ministry of Health to the Rode Kruislaan complex shows the intention to prioritize investments in infrastructure inland, far from the threats of coastal and river floods.

A study conducted by the IDB: Emerging and Sustainable Cities, shows that the location chosen for the project will not be affected by the risks of coastal flooding due to CC, with a return period of 100 years.

Fig.5. Excerpt from the Technical Annex of SU-L1054



2. Goals of the project in the face of climate change

This section is intended to explain the goals of the project in the face of climate change challenges.

Example: The infrastructure component has the goal of (i) adapting to the CC, relocating all the infrastructure of the Ministry of Health to an area that is not affected by coastal flooding and including adaptation measures to the new infrastructure to mitigate flood risks caused by heavy rains; and (ii) mitigate the CC, by incorporating both the adapted and new bioclimatic building principles and energy efficiency measures, which will allow the project to exceed the available standards and comply with the requirements of the EDGE certification.

Fig.7. Excerpt from the Technical Annex of SU-L1054

3. Strategy and/or methodology adopted, details on the measures and/or construction technologies to be included in the project, and technical justification

This section must describe the strategy and/or methodology adopted to identify the measures to be incorporated into the project, and the technical justification for it.

Additionally, all details on the specific construction measures and/or technologies to be incorporated, including those for adaptation to climate change, as well as mitigation, should be incorporated as much as possible.

In case the building is certified, this should be explicitated in this section.

Example: The kindergartens to be financed with the loan include a dry-built industrialized construction system, which has not been used so far in construction works financed by the Ministry of Education and Sports. The main reason for this decision is that these systems are very sustainable, contemplating a rational use of energy and having half the term of execution than traditional construction work.

Example: As for the new building, the general design has been conceived around bioclimatic principles. This has involved the inclusion of passive and active measures in the design requirements, mainly aimed at improving the energy efficiency of the building. Within the tropical climate that characterizes Paramaribo, the most important elements to consider are the building exterior, the cooling technology, and the efficiency of the appliances (including lights).

In addition, taking into account the vulnerability scenario of inland flooding of the construction site, caused by heavy rains, it has been indicated that the new building should be raised from the ground to improve its resistance.

To verify and to evaluate the impact of the measures included in the designs (new and existing), the EDGE tool was used. The set of selected measures was carefully chosen to achieve at least 20% savings required by EDGE certification. The high results obtained with the tool (47.81% and 50.81% in energy, 46.56% and 43.51% in water, 29.57% and 65.09% in materials, respectively for the new buildings and the renovated ones) show that the selected measures largely cover the minimum requirements, which shows that it would be possible to certify the buildings.

Fig.8. Excerpt from the Technical Annex of SU-L1054

4. Estimated budget[27] for the incorporation of the measures

A detailed budget should be included with the highest possible disaggregation, according to availability, considering that at the time of accounting, the project is in its preparation phase.

In case the building is certified, the total estimated budget for design and construction to be certified (excluding equipment) must be included.

Example: The budget indicates the disaggregated prices of the work, separating the specific elements that contribute to climate change mitigation.

Fig.9. Excerpt from the Technical Annex of SU-L1054

ARTICLE	PRICE	MITIGATION
Demolition	$12,500.00	
Transportation	$1,000.00	
Tiles	$8,100.00	
Pillars	$1,080.00	
Ground floor	$36,000.00	
First floor	$36,000.00	
Ceiling	$59,400.00	
Window replacement	$180,000.00	$180,000.00
Ceiling replacement	$12,000.00	$12,000.00
Main girders replacement	$120,000.00	$120,000.00
Solar protection	$20,000.00	$20,000.00
Smaller girders	$4,900.00	$4,900.00
Roof sheets	$3,000.00	$3,000.00
Stairs	$4,000.00	
Internal walls	$36,000.00	
Sanitary services	$24,000.00	
Painting	$12,000.00	
Energy saving lamps	$47,192.00	$47,192.00
Water efficiency measures	$17,766.00	$17,766.00
Total for materials	$621,439.00	$404,858.00
Workforce	$93,215.70	
Installation	$99,430.08	
Landscape	$24,000.00	
Total for one Building	$838,083.78	$404,858.00
Total for two Buildings	$1,676,167.56	$809,716.00

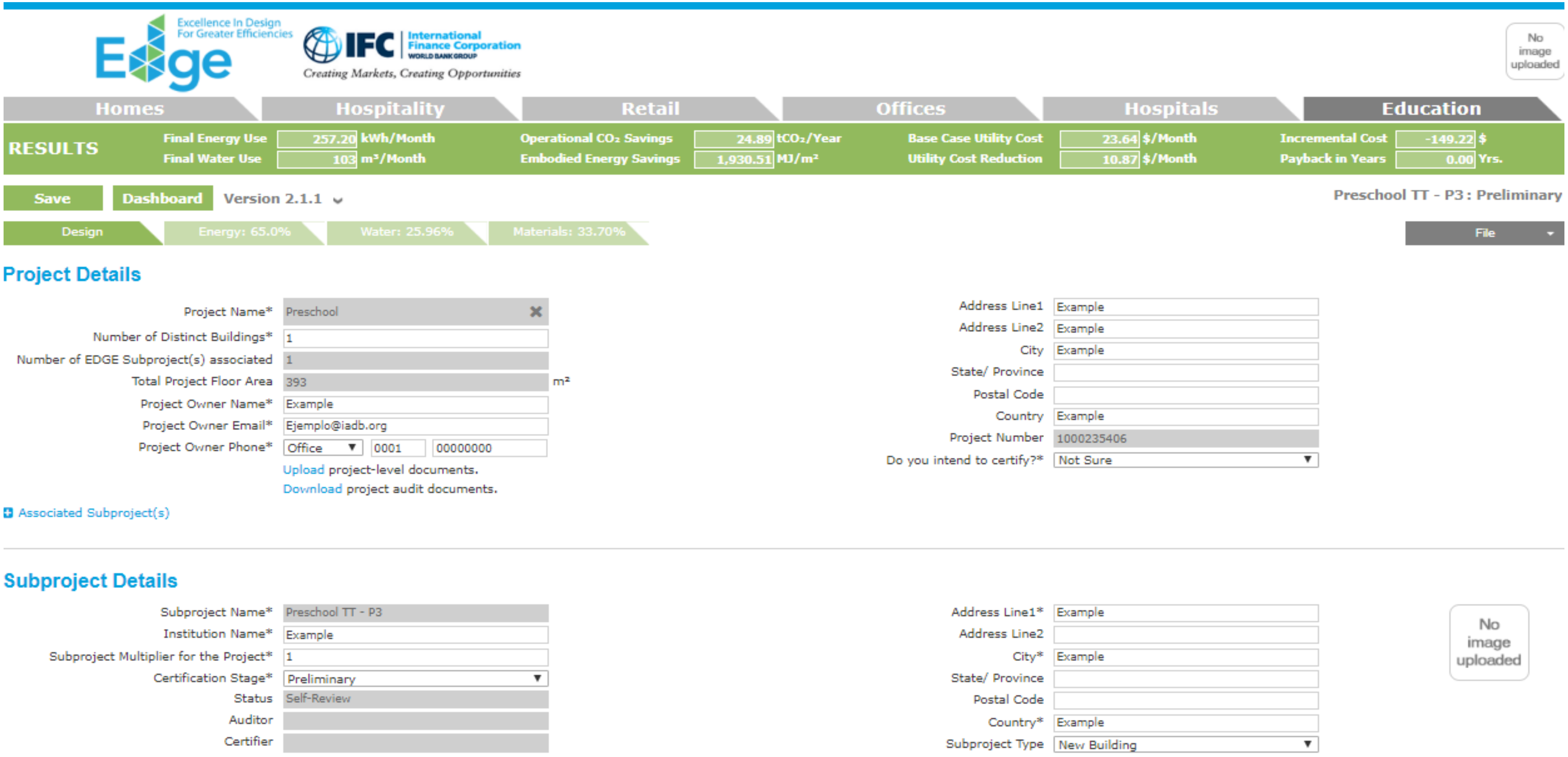
5. Bibliography consulted (if any)

27 An estimated budget is required when buildings do not have certification or measures equivalent to those that would allow certification

Annex II: Lists of parameters considered in EDGE

EDGE, *Excellence in Design for Greater Efficiencies,* iis a free software that helps determine the most economical options for the design of buildings that are efficient in the use of resources. The system also grants certification for buildings that achieve a reduction of at least 20% in energy, water, and energy incorporated in the materials.

The parameters that the EDGE system analyzes in schools, hospitals, and housing infrastructure are listed in the following pages.



Edge — Excellence In Design For Greater Efficiencies | IFC International Finance Corporation, World Bank Group — *Creating Markets, Creating Opportunities* | No image uploaded

Homes | Hospitality | Retail | Offices | Hospitals | Education

RESULTS							
Final Energy Use	257.20 kWh/Month	Operational CO_2 Savings	24.89 tCO_2/Year	Base Case Utility Cost	23.64 $/Month	Incremental Cost	-149.22 $
Final Water Use	103 m³/Month	Embodied Energy Savings	1,930.51 MJ/m²	Utility Cost Reduction	10.87 $/Month	Payback in Years	0.00 Yrs.

Save | Dashboard | Version 2.1.1 | Preschool TT - P3 : Preliminary

Design | Energy: 65.0% | Water: 25.96% | Materials: 33.70% | File

Project Details

Project Name*	Preschool
Number of Distinct Buildings*	1
Number of EDGE Subproject(s) associated	1
Total Project Floor Area	393 m²
Project Owner Name*	Example
Project Owner Email*	Ejemplo@iadb.org
Project Owner Phone*	Office 0001 00000000

Upload project-level documents.
Download project audit documents.

Address Line1	Example
Address Line2	Example
City	Example
State/ Province	
Postal Code	
Country	Example
Project Number	1000235406
Do you intend to certify?*	Not Sure

Associated Subproject(s)

Subproject Details

Subproject Name*	Preschool TT - P3
Institution Name*	Example
Subproject Multiplier for the Project*	1
Certification Stage*	Preliminary
Status	Self-Review
Auditor	
Certifier	

Address Line1*	Example
Address Line2	
City*	Example
State/ Province	
Postal Code	
Country*	Example
Subproject Type	New Building

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Excellence In Design For Greater Efficiencies

International Finance Corporation WORLD BANK GROUP

Creating Markets, Creating Opportunities

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Homes	Hospitality	Retail	Offices	Hospitals	Education

RESULTS								
Final Energy Use	257.20 kWh/Month	Operational CO_2 Savings	24.89 tCO_2/Year	Base Case Utility Cost	23.64 $/Month	Incremental Cost	-149.22 $
Final Water Use	103 m³/Month	Embodied Energy Savings	1,930.51 MJ/m²	Utility Cost Reduction	10.87 $/Month	Payback in Years	0.00 Yrs.

Save | Dashboard | Version 2.1.1

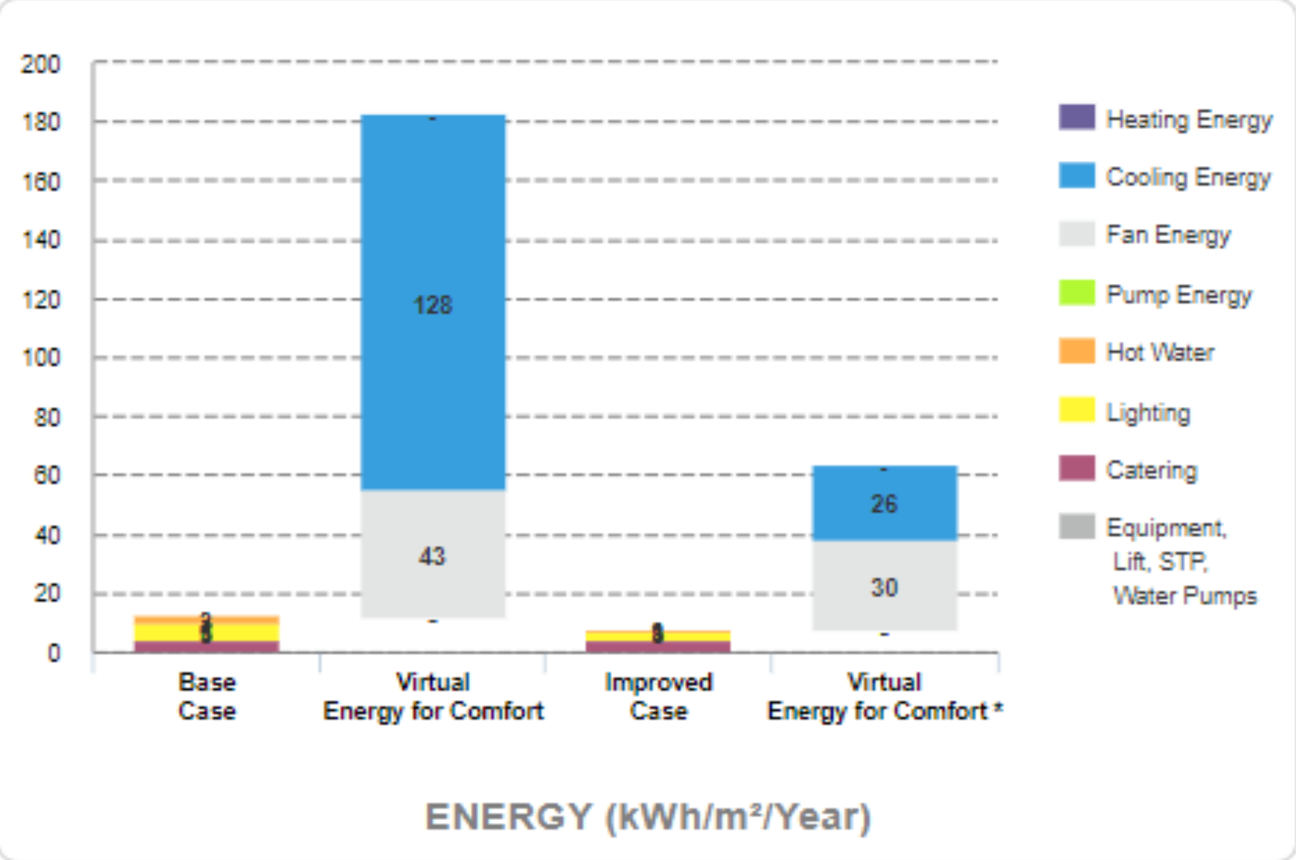
Design | Energy: 65.0% | Water: 25.96% | Materials: 33.70%

Energy Efficiency Measures

65.0%

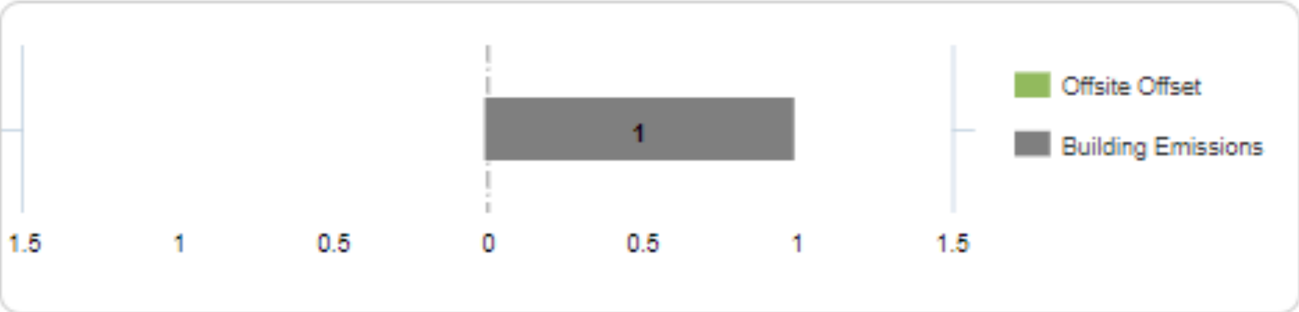
- ❑ EDE01 REDUCED WINDOW TO WALL RATIO
- ❑ EDE02 REFLECTIVE PAINT/TILES FOR ROOF
- ❑ EDE03 REFLECTIVE PAINT FOR EXTERNAL WALLS
- ❑ EDE04 EXTERNAL SHADING DEVICES
- ❑ EDE05 INSULATION OF ROOF
- ❑ EDE06 INSULATION OF EXTERNAL WALLS
- ❑ EDE07 LOW-E COATED GLASS
- ❑ EDE08 NATURAL VENTILATION FOR CORRIDORS
- ❑ EDE09 NATURAL VENTILATION FOR CLASSROOMS
- ❑ EDE10 CEILING FANS IN ALL CLASSROOMS
- ❑ EDE11 VARIABLE REFRIGERANT VOLUME (VRV) COOLING SYSTEM
- ❑ EDE12 AIR CONDITIONING WITH AIR COOLED CHILLER
- ❑ EDE13 AIR CONDITIONING WITH WATER COOLED CHILLER
- ❑ EDE14 GROUND SOURCE HEAT PUMP
- ❑ EDE15 ABSORPTION CHILLER POWERED BY WASTE HEAT
- ❑ EDE16 RECOVERY OF WASTE HEAT FROM THE GENERATOR FOR SPACE HEATING
- ❑ EDE17 VARIABLE SPEED DRIVES ON THE FANS ON COOLING TOWERS
- ❑ EDE18 VARIABLE SPEED DRIVES IN AHUS
- ❑ EDE19 VARIABLE SPEED DRIVE PUMPS
- ❑ EDE20 SENSIBLE HEAT RECOVERY FROM EXHAUST AIR
- ❑ EDE21 HIGH EFFICIENCY CONDENSING BOILER FOR SPACE HEATING
- ❑ EDE22 HIGH EFFICIENCY BOILER FOR WATER HEATING
- ❑ EDE23 ENERGY SAVING LIGHT BULBS FOR INTERNAL SPACES
- ❑ EDE24 ENERGY-SAVING LIGHT BULBS FOR EXTERNAL AREAS
- ❑ EDE25 OCCUPANCY SENSORS IN BATHROOMS
- ❑ EDE26 OCCUPANCY SENSORS IN CLASSROOMS
- ❑ EDE27 OCCUPANCY SENSORS IN CORRIDORS
- ❑ EDE28 PHOTOELECTRIC SENSORS TO HARVEST DAYLIGHT
- ❑ EDE29 SOLAR HOT WATER COLLECTORS
- ❑ EDE30 SOLAR PHOTOVOLTAICS
- ❑ EDE31 OTHER RENEWABLE ENERGY FOR ELECTRICITY GENERATION
- ❑ EDE32 OFFSITE RENEWABLE ENERGY PROCUREMENT
- ❑ EDE33 CARBON OFFSET

65.0% Meets EDGE Energy Standard



Hide the Carbon Emissions/Offset

1.02 tCO_2/Year



*Virtual energy is the amount of energy that will be required based on the assumption that the education will eventually install air conditioning or heating.

Disclaimer: EDGE is designed as comparative software and is not a design tool. Therefore predicted results for energy, water and materials may vary from actuals.

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No image uploaded

Homes	Hospitality	Retail	Offices	Hospitals	Education

RESULTS

Final Energy Use	257.20	kWh/Month	Operational CO_2 Savings	24.89	tCO_2/Year	Base Case Utility Cost	23.64	$/Month	Incremental Cost	-149.22	$
Final Water Use	103	m^3/Month	Embodied Energy Savings	1,930.51	MJ/m^2	Utility Cost Reduction	10.87	$/Month	Payback in Years	0.00	Yrs.

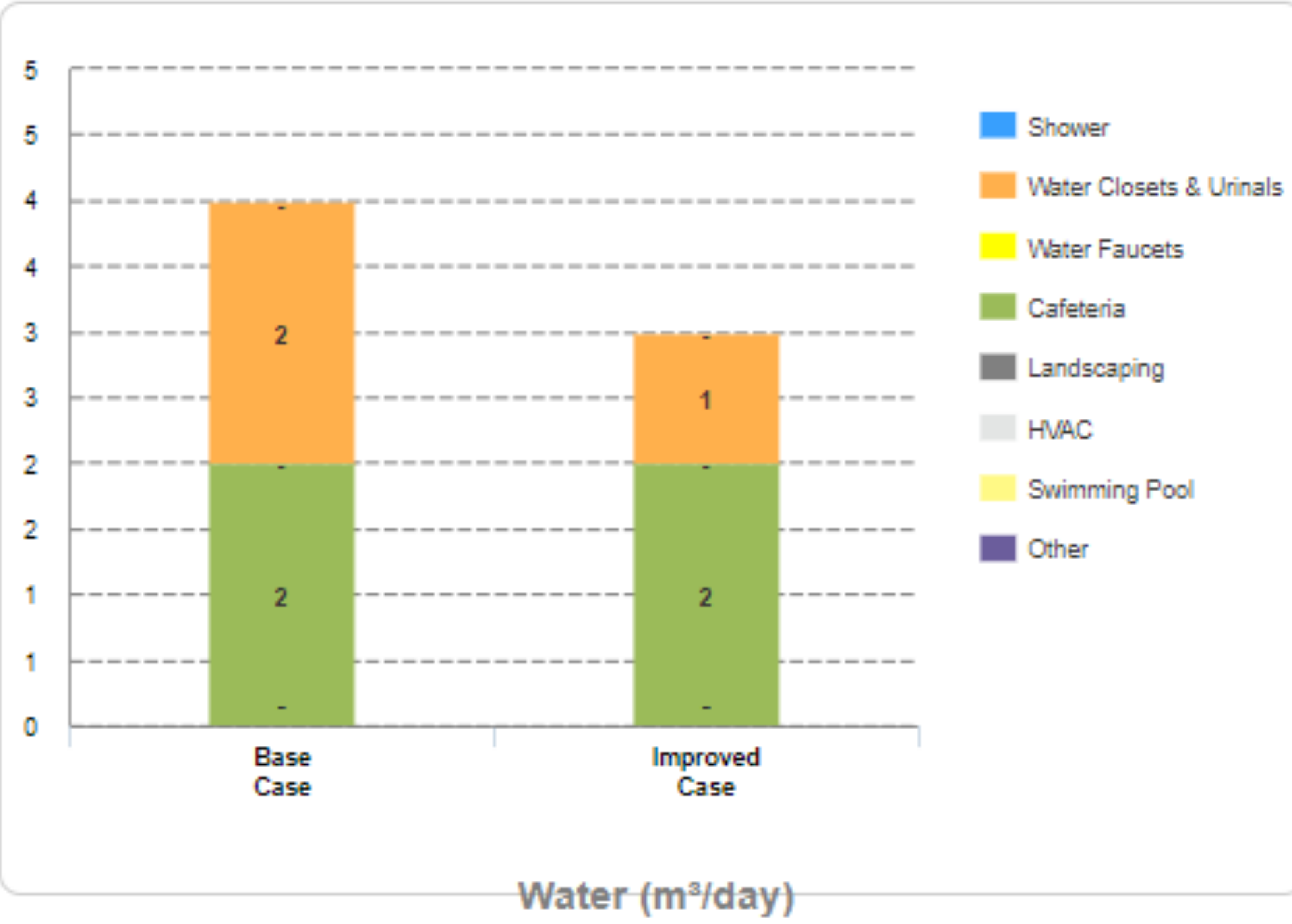
Save | Dashboard | Version 2.1.1

Design | Energy: 65.0% | Water: 25.96% | Materials: 33.70%

Water Efficiency Measures

- ❑ EDW01 LOW FLOW SHOWERHEADS
- ❑ EDW02 LOW FLOW FAUCETS
- ❑ EDW03 DUAL FLUSH WATER CLOSETS
- ❑ EDW04 WATER EFFICIENT URINALS
- ❑ EDW05 WATER EFFICIENT FAUCETS FOR KITCHEN SINKS
- ❑ EDW06 CONDENSATE WATER RECOVERY
- ❑ EDW07 RAINWATER HARVESTING SYSTEM
- ❑ EDW08 WATER EFFICIENT LANDSCAPING
- ❑ EDW09 SWIMMING POOL COVER
- ❑ EDW10 GREY WATER TREATMENT AND RECYCLING SYSTEM
- ❑ EDW11 BLACK WATER TREATMENT AND RECYCLING SYSTEM

25.96% Meets EDGE Water Standard



Disclaimer: EDGE is designed as comparative software and is not a design tool. Therefore predicted results for energy, water and materials may vary from actuals.

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Homes | Hospitality | Retail | Offices | Hospitals | **Education**

RESULTS											
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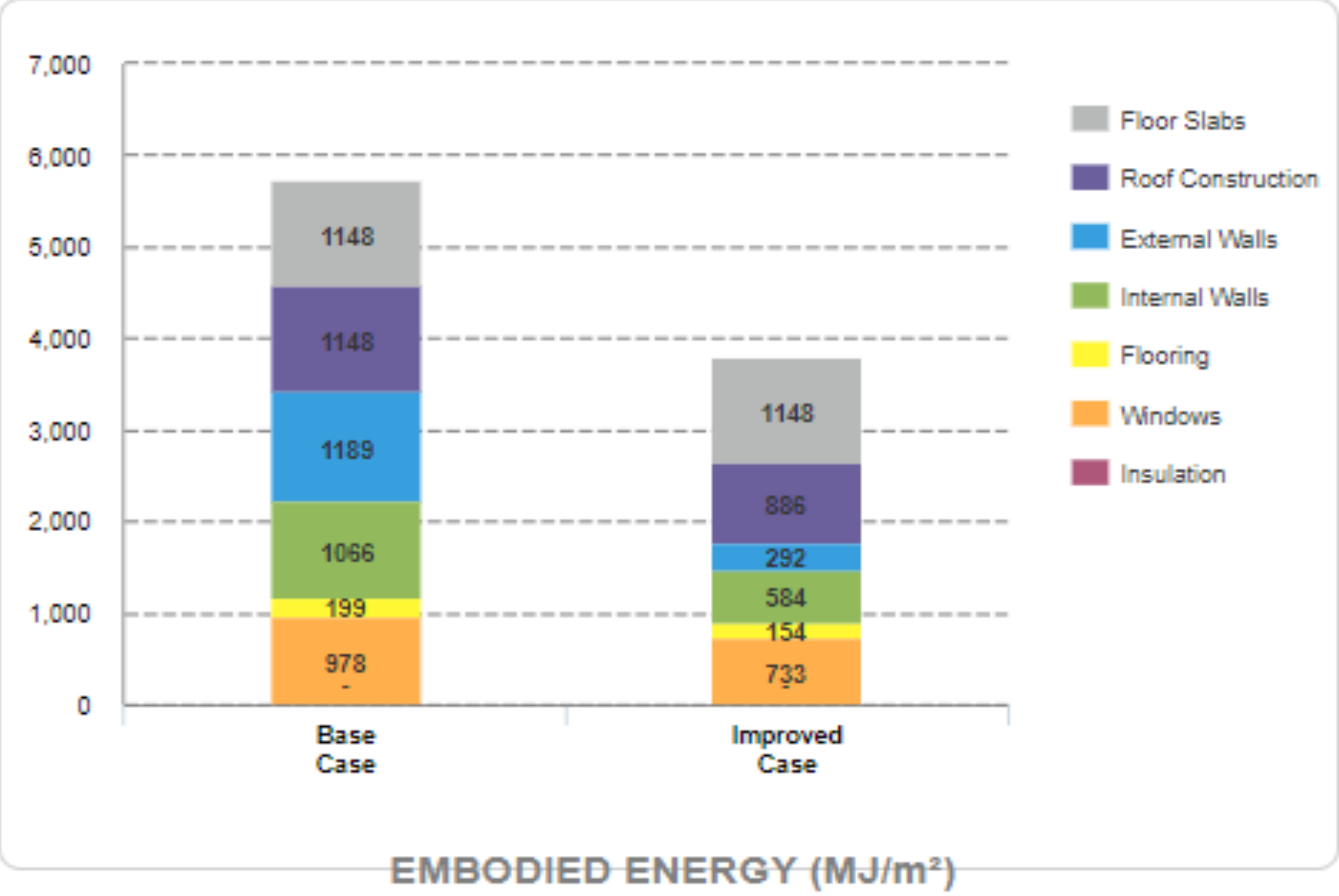
Save | Dashboard | Version 2.1.1

Design | Energy: 65.0% | Water: 25.96% | Materials: 33.70%

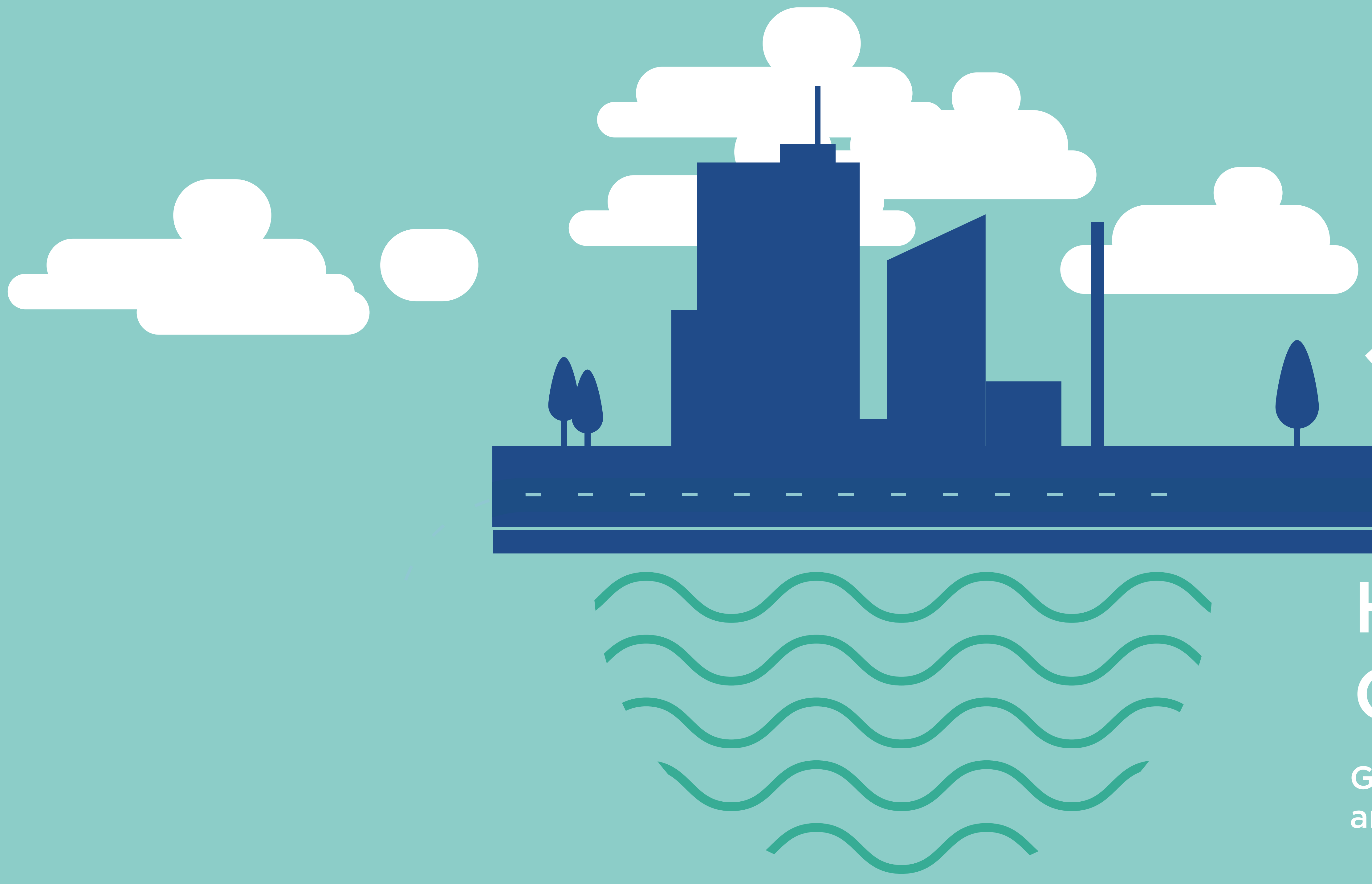
Materials Efficiency Measures

- ❑ EDM01 FLOOR SLABS
- ❑ EDM02 ROOF CONSTRUCTION
- ❑ EDM03 EXTERNAL WALLS
- ❑ EDM04 INTERNAL WALLS
- ❑ EDM05 FLOORING
- ❑ EDM06 WINDOW FRAMES
- ❑ EDM07 & EDM08 – INSULATION

33.70% Meets EDGE Material Standard



Disclaimer: EDGE is designed as comparative software and is not a design tool. Therefore predicted results for energy, water and materials may vary from actuals.



TOWARDS 30% CLIMATE FINANCE:

How Can Buildings Contribute to It?

Guide for the incorporation and accounting of mitigation and adaptation measures to climate change

Livia Minoja - Luz Fernandez - Rossemary Yurivilca

IDB

Social Infrastructure