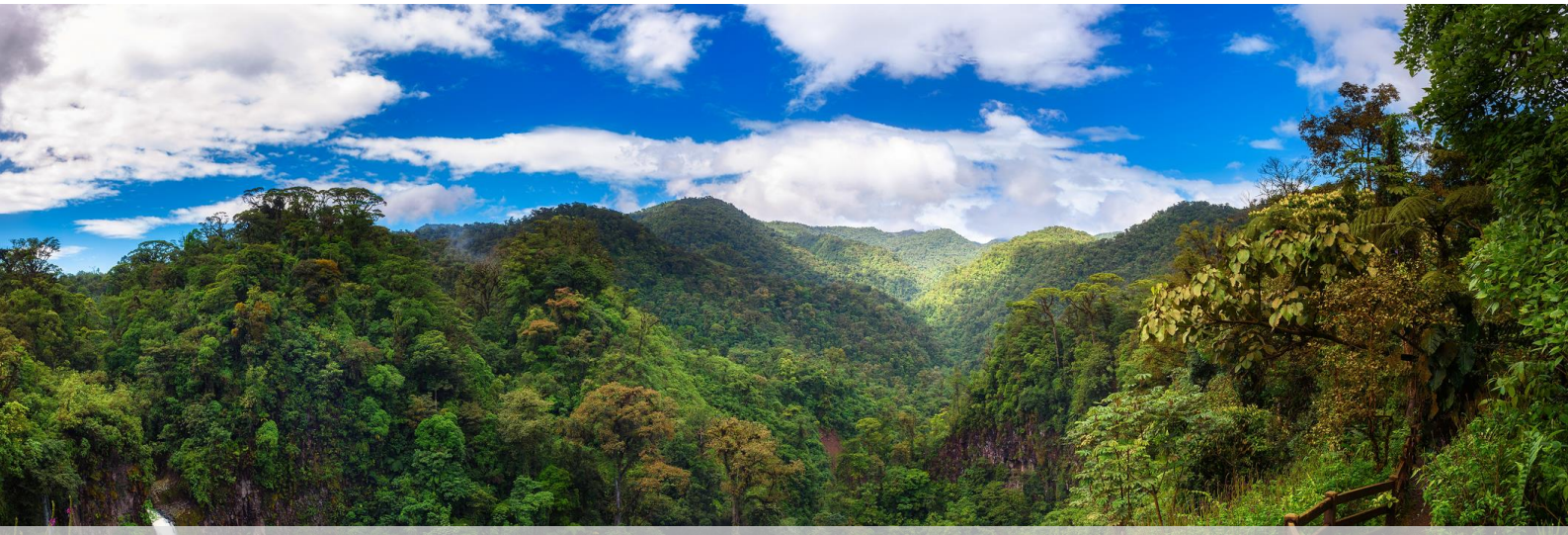
UK GBC



Around the World in 80 Case Studies

Costa Rica

Around the World in 80 Case Studies

Those of you who know us will know that UKGBC is an industry-led network with a mission to radically improve the sustainability of the built environment.

We represent the voice of the industry's current and future leaders who are striving for transformational change.

We inspire, challenge and empower our members, helping them to identify and adopt the most sustainable, viable solutions.

We also engage our members in advocating a progressive message to government, informing and influencing policy.

Our membership has gone from strength to strength in the last year – covid highlighting both the need and possibility for rapid change. Covering the whole value chain we now have well over 500 members and continue to welcome new members each month.

Importantly our focus has shifted from explaining *why* we need to act on sustainability to *how*. This decade needs to be a decade of delivery if we are to keep within the 1.5 degrees recommended by the IPCC. It will take all of us, in all our varied roles as members of businesses, government leaders and as citizens.

And this series of case studies forms a key part of that move to how – exploring how others have achieved results in different parts of the world, that we can all learn from.

So welcome everyone to the first in our 'Around the World in 80 Case Studies' series. Inspired by the adventures of Phileas Fogg in French novelist Jules Verne's novel, published in 1872, we are embarking on our own adventure around the world.

Since 1872 when Phileas Fogg set off, CO2 have risen from 288ppm to today's 418ppm – which sets the context for our modern circumnavigation.

Nearly 150 years on from Fogg's original journey, ours is an architectural, virtual and covid-safe adventure, that will explore some of the buildings and places responding to the challenges of global warming in the year leading up to what we hope will be another landmark COP Summit in Glasgow in November.

For this section of the journey, we are heading to Costa Rica. A country which has topped the Happy Planet Index rankings with a substantial lead multiple times, Costa Rica is also home to the greatest density of species in the world. Through the case studies here we will explore further how these key principles of wellbeing, biodiversity and sustainability are being shown in the built environment as well.

Bienvenidos a Costa Rica

Setting the Scene...

Think of Costa Rica and you no doubt are imaging something pretty idyllic; lush forest surrounding towering volcanoes, beautiful birds and biodiversity, a happy population and thriving culture?

No matter what you know the country for, it is clear Costa Rica (or 'Rich Coast' in Spanish) is getting something right. But to understand why, we have to look back seventy-two years ago, when Costa Rica did something fairly unheard of for a nation; they did away with the army. As the country's president Carlos Alvarado Quesada said in Davos in 2019 'This [action] allowed for many things'. For example, with huge amounts of money no longer spent on the military, 8% of Costa Rica's GDP is invested in education – nearly double the global average of 4.6%. This is one of the key reasons that Costa Rica have continually tops the Happy Planet Index.

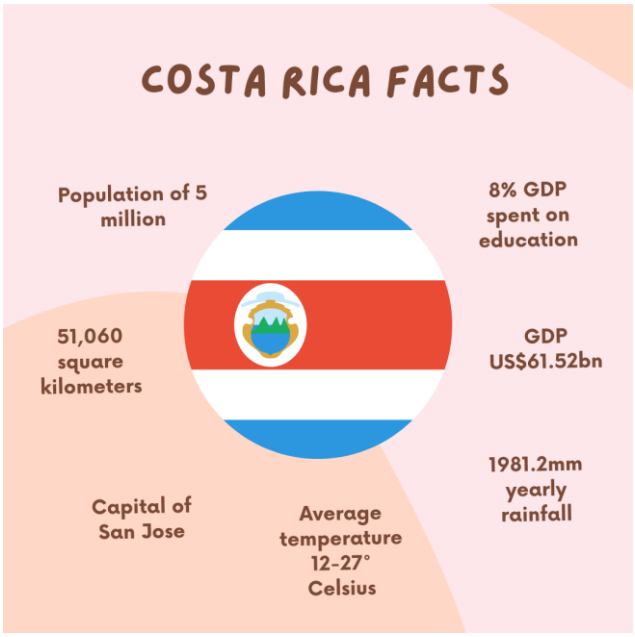
The move was also part of the reason that the country was able to focus on initiatives to protect the environment to a much greater extent. Combined with the removal of cattle subsidies in the mid-1980s and a landmark forestry law in 1996 that banned deforestation, Costa Rica was able to regenerate it's forest cover from 25% back up to 52% - nearly double!

This history clearly shows that Costa Rica has long taken action as a global green pioneer with a strong social conscience, but fast forward to today and the Central American nation is continuing to take huge strides. In 2010, Costa Rican diplomat Christiana Figueres was appointed Secretary of the UN framework Convention on Climate Change (UNFCCC), shortly after the failed COP15 negotiations in Copenhagen. Over the next six years she revolutionised global climate change negotiations, most famously driving through the 2015 Paris Climate Agreements; the legally binding international treaty on climate change adopted by over 196 countries. She also happens to run a brilliant podcast called Outrage and Optimism, if you haven't yet listened!

Even though this country of 5 million people produces just 0.02% of global emissions, and already generates more than 99% of its electricity from renewable sources, it is taking further steps to fulfil its commitments under the Paris Climate Agreement. In February 2019 the country launched its National Decarbonisation Plan. This plan aims to achieve net zero emissions by 2050 and led to the country being awarded the United Nations Environment Programme's Champions of the Earth award for policy leadership in 2019. With bold mid and long terms targets for reforming transport, waste, land use and energy. As such, the built environment will need to play a key part in responding to and reaching this goal.

Whilst Costa Rica may be ahead of most countries in achieving their environmental goals, there are still challenges that they face. The biggest challenge likely being the decarbonisation of the transport sector, which currently accounts for 40% of their emissions. Like many other countries in the world, air quality is also a concern for Costa Rica, with some parts of the capital San Jose breaching World Health Organisation limits for air pollution.

Despite the road ahead, the country remains positive. In fact, President Alvarado is clear that environmental efforts have in fact helped boost Costa Rica's economy: "Many people say that to protect the environment goes against the economy. Whereas it's the complete contrary. Our tourism has grown precisely because of this." We hope that this message can be heard far and wide ahead of the United Nations Climate Action Summit later this year, when Member States will once again join to outline how they plan to cut emissions.



Our local hosts

Our guides for the first three stops of our tour of Costa Rica are:

Nicolas Ramirez

CEO, GBC Costa Rica

Nicolas is CEO of GBC Costa Rica, He is a consulting engineer committed to making contributions towards market transformation in the building sector that will prioritize human well-being in the built environment for future generations. His expertise includes new business development, stakeholder engagement, growth strategies, project management and advocacy. Nicolas enjoys generating new ideas and implementing feasible solutions to broadly relevant problems.

Benjamin Saxe

Founder & Design Director, Studio Saxe

Benjamin's belief in the positive role architecture can play in society around the world stems from his studies in Costa Rica and the USA, as well as his work in Europe on a number of large international projects. This experience is combined with a long-held desire to use design to "do more with less" and ensure that craft and technology work seamlessly together to create buildings and spaces for all. Architecture should not be reserved as a luxury but instead provide a platform for experimentation.

Brigitte Solís Wolffson

Sustainability Manager, Circuito

Brigitte leads the Sustainability Department in Costa Rica Circuito CoE Johnson Controls since 2017. Brigitte obtained a master's degree in Sustainability and Architecture from UPC (Polytechnic from CataluÃ±a, Spain in 2012. She is LEED AP (BD+C and ID+C). Certified EDGE Consultant and Auditor Certified. Also holds an Architect Degree from Veritas University, Costa Rica.

1 Britt Morpho Retail HQ

Heredia Municipality; IECA Internacional, SDE, MEP, Lumina, TPA, BILCO, Sinergia, LEED

Key facts

2,900m²

In use, completed 2019

Office, Retail

✓ Climate Change – Health & Wellbeing

Project overview

The building was designed to achieve LEED Platinum Certification, maximizing both energy and water credits. The design uses sustainable materials that improve space quality, including rapidly renewable cork flooring that provides a warm atmosphere for the workspace area. Optimizing the building's form and orientation improves energy performance, allowing on-site photovoltaics to generate 103% of needed energy. Operable windows increase natural cross-ventilation throughout the space.

Orientation reduces solar exposure on the east and west facades by shading the longer north and south facades with roof overhangs. The building's narrow shape allows for natural ventilation and daylight penetration. For water use, not only the specification of low consumption features was considered, but the use of native plants and other irrigation techniques for landscape allowed a water use reduction of 78%. The elevated floor plan takes advantage of the lower humidity level during wet months.

Notable achievements

✓ LEED Platinum

2 CASA CARAZO

San José; CARAZO ARQUITECTURA

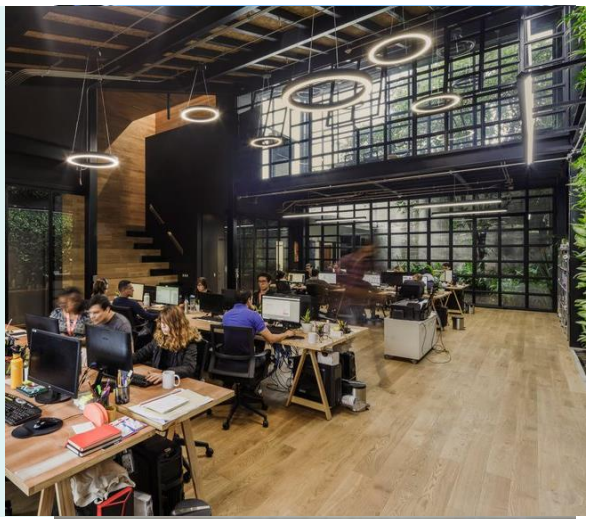
Key facts

560m^2

In use

Office, Refurbishment, New build

✓ Climate Change - Resource Use – Nature & Biodiversity – Health & Wellbeing



Project overview

The project set out to explore the future of office space and its relation to wellbeing, happiness, health, productivity, reduced CO2 footprint, reduced resource consumption, urban revival and human contact with nature.

Climate Change: Co2 Footprint reduction through strategies such as reduced energy consumption, natural cross ventilation, natural indirect illumination, green roof reducing heat island effect, usage of vegetation and low carbon embodied materials. The project manages to reduce embodied energy in its materials by 71.6% in relation to a base case while at the same time reducing CO2 emissions by 70% through CO2 fixated by vegetation representing a 318% increment of green areas from initial condition.

Resource Use: reduced consumption of water by 20.55% over base case through low flow fixtures, double discharge toilets and drip microirrigation of green areas. In terms of electrical consumption the project has savings of 45.28% prioritizing natural indirect lighting, low energy consumption lamps and natural ventilation avoiding A/C. The project is located in the centre of the city in proximity to public transportation.

Nature and Biodiversity: The biophilic design philosophy of the project proposes integration of nature at different levels of proximity creating a high quality space where wellness prevails.

Health and Wellbeing: through direct contact with the environment the project allows users to avoid breathing recirculated air and through biophilic design it reduces the levels of stress and tiredness increasing productivity and well being.

Notable achievements

✓ Edge Advanced Certification

Further resources

Find out more here.

3 Centro de Convenciones

Heredia Municipality; Aplitec, BA Ingeniería, PCH Civil

Key facts

15,432m^2

In use, completed 2018

Convention Center

✓ Nature & Biodiversity - Climate Change – Resource Use

Project overview

Costa Rica prides itself in pioneering eco-tourism. As such, this 15,000-square-meter facility practices and preaches sustainability in every corner.

Onsite water retention areas typically become large unused pits. Our solution was to divide and conquer by distributing the retention areas across the site in shallow bioswales that naturally filter the toxins and dirt onsite before returning the water to the soil. In this region of Costa Rica, rainfall is significant for 75% of the year, resulting in opportunities to capture rainwater for re-use. Rainwater is filtered and provides 100% of the water used for toilets. 100% of all wastewater is treated onsite in a plant located on the eastern side of the property. The processed water is used for irrigation throughout the site.

A louvered system at the high levels provides immediate relief, while a densely vegetated zone just outside the glass will grow in to create similar light filtering effects of a rainforest canopy. By using a solar gather and re-directing product called a Solatube, the hall was able to finely control the natural light levels allowed into the space. During the day, there is enough light that a convention event does not need to turn on the artificial lamps to supply general overhead lighting for the space.

Notable achievements

✓ LEED Gold, Bandera Azul Ecológica (Construcción Sostenible), bEQ Certified, Edge Certification

Further resources

Find out more here

4 Edificio ODM

Goicoechea municipality; ARQUITECTO DANIEL LACAYO Y ASOCIADOS S.A., ENEX, IECA, CIRCUITO, BEHC, TPA, VAN DER LAAT Y JIMINEZ

Key facts

23,000m²

Building in use

Office

✓ Climate Change - Resource Use – Health & Wellbeing – Socio-Economic Impact – Nature & Biodiversity

Project overview

The ODM is an office building whose end user is the Government, specifically some dependencies of the Central Bank of Costa Rica. The project team and the client are completely environmentally conscious and are aware of the importance and all the benefits of having a LEED certified building. The project is located in Barrio Tournón, San Jose, Costa Rica. The Project building consists of a 6 levels development for office space including 2 levels of parking spaces, and 2 basement levels for parking garage. Additionally, the building has public park, that connect with nature pedestrian paths, that will connect more than 25 km from the north and south of San Jose. The building will have a highly efficient curtain wall glazing envelope. The design must incorporate a Low e glazing and an economic feasibility analysis using an energy simulation software. Additionally, the project will have highly efficient VRF that allow very high performance on the part load operation.

Notable achievements

- ✓ LEED BD+C New Construction Gold Certified
- ✓ Programa Bandera Azul Ecologica

Further resources

Find out more here

5 Gardenia

San José; Studio Saxe, Prodeyco, Sotela Alfaro Ltda, CIEM

Key facts

5000m²

In construction (2021 completion)

Residential

Climate Change - Resource Use – Health & Wellbeing – Nature & Biodiversity

Project overview

In accordance with the Sustainable Development Goals and climate change, Gardenia offers specific solutions to global problems. It is the habitat of dozens of different varieties of plants that contribute to a healthy carbon cycle within the urban area, leaving an important green footprint in the city from the inside to the outside of the building.

As a great impact on the use and reuse of resources Gardenia uses simple and low impact methods to provide great solutions such as using adequate substrate and vegetation cover for water conservation avoiding the use of irrigation for green areas with a temporized irrigation system to avoid water waste, recirculating water system for the vertical garden, composting of organic waste, local organization and local government entities for the control and management of materials or valuable waste, implementation of gardens to exercise food sovereignty and also be feeding centres for wildlife.

There are dozens of plants that have the purpose of hosting native bees and pollinators such as butterflies, insects, and microorganisms that contribute to the biological control of phytopathogens organically without the use of reactive chemicals, our basis is prevention. We have created restaurants for birds by planting endemic fruit and ornamental trees, for example, Supara, a tree endemic to the Central Valley of Costa Rica, which does not exist in any other part of the country or the world and is in danger of extinction.

Further resources

Find out more here

6 Plaza Roble y Escazú Corporate Center

San José; Ambito Arquitectura y Sostenibilidad, Sinergia Ingeniería

Key facts

102,756m²

In use, completed 2019

Office

✓ Climate Change - Health & Wellbeing

Project overview

This project is the retrofit of 5 existing office buildings which are 12 to 20 years old. The project includes the upgrade of energy systems, addition of submetering (energy and water), development and implementation of green policies and continuous surveys of building occupants and visitors in order to understand their patters of use and level of satisfaction. The retrofit and reuse of these 5 buildings helped reduce operational carbon emissions by upgrading the building systems and helped reduce embodied carbon emissions by avoiding the construction of new buildings. This will help mitigate climate change by reducing the flow of GHG into the atmosphere.

As part of the retrofit, a major renovation of existing AC system was performed in in order for each of the buildings to achieve compliance with the requirements of ASHRAE Standard 62.1 -2016. This will contribute to the comfort and well-being of all building occupants by establishing minimum standards for indoor air quality. Additionally, TVOC testing was performed in representative areas of all buildings in order to guarantee reduced concentrations of chemical contaminants that can damage air quality and the environment, and to protect the health, productivity, and comfort of building occupants.

Notable achievements

- ✓ All 5 buildings achieved a LEEDv4.1 GOLD Operations and Maintenance certification.

Further resources

Find out more here

7

Surf Simply

Nicoya municipality; Gensler, Constructora Rodrigo Altmann, S3, SPHERA Sostenible

Key facts

1151.55M2

In use

Hospitality

✓ Health & Wellbeing – Nature & Biodiversity – Resource Use

Project overview

The materials used in the project intended to be local to decrease carbon footprint as much as possible, and specified materials with high recycled content to decrease the use of virgin resources in the project.

The project location is in a protected zone, where biodiversity is protected, so construction impact had to be minimal, trees and fauna were kept in place as much as possible to keep biological corridors as natural as possible. Also, rainwater was designed to be handled in place to avoid increasing runoff.

The projects vision is centred around the guest and its experience around nature, the beach and surf. Views, thermal comfort, daylight and nourishment were items considered in detail to give the guest an experience of wellness, tranquillity and health.

Notable achievements

✓ LEED Platinum Certified

Further resources

Find out more here

8 Tribunales de Justicia Los Chiles

Los Chiles municipality; OPB Arquitectos, Guidi Estructurales, Constructora Gonzalo Delgado

Key facts

1,330m²

In use, completed August 2020

Government building

✓ Climate Change - Resource Use – Socio-economic Impact

Project overview

The project of the Court of Justice of Los Chiles, has several important components in its design and construction. Due to it's geographical location, where the weather is very hot and dry, the use of photovoltaic energy and natural ventilation in the internal patio was a key element. The building has 120 photovoltaic panels on the roof to support main systems.

Another major design criteria was the decision to avoid sites requiring soil stabilization and deep foundations; due to the characteristics of the soil the structural team fought against groundwater levels. The optimisation of the building shape and orientation was an important approach to achieve a comfort internal space without using air conditioning systems. In relation to water based concerns, the project focused on Rainwater Harvesting System due to the huge amount of precipitation throughout the year and also a Black Water Treatment and Recycling System.

Finally the project directly and indirectly has a very important impact in the community. The zone of Los Chiles is well known for being a border city with associated problems and has also been overlooked as an area for infrastructure investment during recent history of Costa Rica. This project will provide work, security and an initial landmark to the city.

Further resources

Find out more here

9 TORRE UNIVERSAL

San José, Portafolio Inmobiliario, Gensler, Circuito Johnson Controls, Bilco

Key facts

80,000m²

In use

Office, retail

✓ Climate Change – Resource Use - Social Value

Project overview

Resource Use: during construction 82% was diverted from landfill, with donation, reuse and recycling. Rainwater is used for the first 8th floors restrooms and also for landscaping irrigation. Socio-Economic impact: It will create new jobs, also attract foreign investment such as Microsoft and will be the heart of a new technological city planned in San Jose

Climate Change: reduction in energy consumption of 23% was achieved.

It was quite a challenge: when the project started, it was one of the first to aim for the new version of LEED v4 in Costa Rica. This version is more demanding, but having achieved the the goal of Gold certification, it set a high bar for our region and for the new version. Working collaboratively and not losing sight of the goal during the process was the most important thing. Integrating all the interested parties so that they aligned and understood the importance of certification was the key to success.

Notable achievements

- ✓ LEED GOLD Certified.
- ✓ Achieve 52 indoor water use reduction, reused rainwater for toilets and irrigation

Further resources

- You can find out more here

10 Valle Azul

Alajuela Municipality; FUPROVI

Key facts

Two units of 50m²

In use

Residential

✓ Social Value

Project overview

The complex is made up of 102, two-unit homes, of which unit #30 has been EDGE certified. Unit #30 is home to two families, providing the residents with ample privacy. This project worked as a pilot for delivering higher quality social housing by not only providing better finishes and access for disabled people but also addressing the importance of lowering down the utilities cost by doing a certification process such as EDGE.

The main objective was to provide an optimisation of energy and water use plus the benefits of better thermal comfort.

Social housing can be designed in a way that does not make it impossible to achieve sustainability certification. It does not have to cost more, but it can bring better quality of life by the benefits acquired in the cost of utilities

Further resources

Find out more here

Around the World in 80 Case Studies

Future Itinerary

Thanks for joining us in Costa Rica. We hope to see you on future expeditions in this ongoing series.

October:	China
January:	Middle East