ICONIC SUSTAINABLE BUILDINGS

विद्युत मंत्रालय
MINISTRY OF POWER
सत्यमेव जयते

G20 भारत 2023 INDIA

A COMPILATION FROM G20 MEMBERS AND BEYOND

100 ICONIC SUSTAINABLE BUILDINGS

SUSTAINABLE ENERGY FOR ALL

TABLE OF CONTENTS

Passive House Pichler in Pfitsch, Italy (page 94)

Photo courtesy of Arch. Walter Colombi & Arch. MSc. Urb. Arthur Pichler

आर. के. सिंह
R. K. SINGH

सत्यमेव जयते

विद्युत मंत्री एवं
नवीन और नवीकरणीय ऊर्जा मंत्री
भारत सरकार
Minister of Power and
Minister of New & Renewable Energy
Government of India

India's G20 Presidency in 2023 has been guided by the ethos of "Vasudhaiva Kutumbakam" – One Earth, One Family, One Future. Over the course of the year, this concept has inspired the deliberations of G20 Nations towards unity in their vision for clean, sustainable, affordable and inclusive energy transitions. A commitment to implementing such transitions emerged clearly in the New Delhi Declaration that was adopted by G20 Leaders.

India's rich architectural traditions encourage high quality of life while maintaining harmony with the natural environment. Today, modern technological solutions, architects and designers worldwide are crafting new ways of living that can meet the needs of a growing urban population and preserve the planet.

The "100 Iconic Sustainable Buildings" publication illustrates pioneering efforts in G20 Nations and beyond. This compendium is a collection of a diverse array of architectural marvels, with their unique story of sustainable innovations.

I am happy to share this compliation with the G20 energy Ministers and others, urging them to promote sustainable habitat in their countries, so that we can embrace "Vasudhaiva Kutumbakam" in true spirit.

21/12

SHRI R. K. SINGH
Minister of Power and Minister of New & Renewable Energy, Government of India

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This compilation of "100 Iconic Sustainable Buildings" allows us to visualize a world where architecture innovation can support the environment, fostering a clean energy future. From cutting-edge technologies to ingenious design and environmental stewardship practices, these buildings demonstrate that high living standards for all in harmonious coexistence with nature are not only attainable, but imperative to turn the G20 commitments into widespread energy transitions progress.

Establishments in this compilation demonstrate how we can steer this trend onto a sustainable trajectory. Through passive design strategies and efficient heating, cooling and ventilation technologies, these buildings can provide thermal comfort with minimum energy use. Sustainable occupant behaviours through awareness and engagement remind us that our daily choices are a powerful instrument to foster mindful energy consumption, in line with the principles of the Mission LiFE (Lifestyle for Environment) movement launched by Hon'ble Prime Minister Narendra Modi.

I hope that the "Iconic Sustainable Building celebration" in India and other G20 countries would inspire upcoming G20 presidencies to continue fostering partnerships in sustainable construction practices that go hand-in-hand with clean energy transitions in the world.

My compliments to all the participants of '100 Iconic buildings and the technical institutions who organized it across the world as part of India's G-20 Presidency in 2023.

SHRI PANKAJ AGARWAL
Secretary, Ministry of Power, Government of India

RIGHT TO INFORMATION

G20 भारत 2023 INDIA

स्वच्छ भारत
एक कदम स्वच्छता की ओर

AJAY TEWARI
अपर सचिव
ADDITIONAL SECRETARY

भारत सरकार
GOVERNMENT OF INDIA
विद्युत मंत्रालय
MINISTRY OF POWER
श्रम शक्ति भवन, रफी मार्ग
SHRAM SHAKTI BHAWAN, RAFI MARG
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FOREWORD

This compilation of "100 Iconic Sustainable Buildings" presents an inclusive blueprint that ranges from landmark commercial towers to smaller residential units, includes industrial facilities, spans across geographies and climates, and combines modern and tranditional practices. In this way, these buildings have the potential to create a ripple effect, prompting architects, policymakers, and citizens to adopt similar approaches to sustainable urban development.

In India, like many countries in the Global South, urban areas are expanding rapidly. By 2040, approximately half of the Indian population is expected to live in cities, and most of the buildings that will host future urban dwellers have yet to be built. The increase in residential floor space will enhance energy demand in the buildings sector and therefore seek for energy saving design and construction materials.

I am sure this compendium will be a source of inspiration and a call to action for architects, designers, and visionaries around the world. This will become an indispensable reference for professionals in the building sector, as well as a source of enlightenment and motivation for the upcoming G20 Presidency.

SHRI AJAY TEWARI
Additional Secretary, Ministry of Power, Government of India

RIGHT TO INFORMATION

PREFACE

In an era defined by the urgency to address climate change and forge a sustainable future, the theme of "Vasudhaiva Kutumbakam" – The World Is One Family – has underpinned India's G20 Presidency in 2023. Under this vision, the initiative titled "100 Iconic Sustainable Buildings" aspires to elevate the discourse on sustainable architecture and inspire a global shift towards climate-conscious design and living practices.

The publication is a testament to the trailblazing efforts and ingenuity demonstrated by architects, designers, and visionaries from G20 Nations and around the world. Each of these structures, meticulously selected based on a set of comprehensive and inclusive criteria, exemplifies a resounding commitment to sustainability. The task of curating this compilation was a collaborative endeavor, led by the Bureau of Energy Efficiency (BEE) of India, with contributions from esteemed organizations.

Within these pages, you will find a diverse array of architectural marvels, each with its unique story of sustainable innovation. From cutting-edge technologies to ingenious design and environmental stewardship, these buildings demonstrate that high living standards in harmonious coexistence with nature are not only attainable, but imperative.

May this compilation serve as both a source of inspiration and a call to action, reminding us that the path to a sustainable future begins with a collective commitment to our global family.

Abhay Bakre

SHRI ABHAY BAKRE
Director General, Bureau of Energy Efficiency
Ministry of Power, Government of India

ACKNOWLEDGEMENTS

The "100 Iconic Sustainable Buildings" compilation is a result of a collaborative endeavour, led by the Bureau of Energy Efficiency (BEE), with contributions from partners including Sustainable Energy for All (SEforALL), the Alliance for an Energy Efficient Economy, the World Green Building Council and local Green Building Councils, the Passivhaus Institut, German Development Cooperation, the Delegation of European Union to India and the Ministry of Ecological Transition of France.

We recognize the supervision from Power Secretary Shri Pankaj Agrawal and Additional Secretary Shri Ajay Tewari from the Ministry of Power, and the guidance by Shri Abhay Bakre, Mr. Arijit Sengupta, and Mr. Manish Kumar from BEE. The development was led by Mr. Brian Dean. Other authors are Dr. Satish Kumar, Mr. Pramod Kumar Singh, Ms. Giorgia Pasqualetto and Ms. Nupur Shah. Ms. Supriya Gulati and Mr. Pedro Incháustegui Balcárcel provided coordination support.

The information contained in this publication was collected by a third party, and partly validated with the building owners and designers. This is a living document, and the authors welcome further updates. If you would like to share any further information, please contact **info@missionefficiency.org**

A panel of international experts lent their expertise to this process. They include:

- Audrey Nugent, DirectorGlobal Advocacy, World GBC
- Camille Sifferlen, Founder, Passiv Optim and Board of Directors, la Maison du Passif, former Passivhaus Institute
- Elizabeth Chege, Energy Efficiency & Cooling Specialist, SEforALL & Chair of Africa Regional Network of WorldGBC
- Ian Hamilton, Professor of Energy, Environment and Health, Faculty of the Built Environment, UCL
- Mona Mohammed, Programme Office, UNEP
- Rajan Rawal, Executive Director of CARBSE at CEPT University
- Tilly Lenartowicz, Director of Environmental Engineering at MASS Design Group
- Usha Iyer-Raniga, Professor at the School of Property, Construction and Project Management at RMIT University
- William Prindle, Vice President, Sustainable Energy and Climate and ICF Climate Center Senior Fellow

INTRODUCTION

Under the theme of India G20 Presidency "Vasudhaiva Kutumbakam" – The World is One Family - this compilation showcases 100 Iconic Sustainable Buildings in G20 nations. It also includes a selection of additional mentions for iconic sustainable buildings in non-G20 countries.

These are exemplary establishments that demonstrate how sustainable architecture practices can foster high-quality living standards in balance with the environment.

A sustainable built environment is a cornerstone in efforts to advance sustainable and resilient development and address climate change. In this context, this compilation seeks to elevate the discourse on sustainable architecture and raise awareness on the role of sustainable buildings in:

- **Climate Mitigation:** Sustainable buildings play a crucial role in mitigating climate change by reducing energy consumption and greenhouse gas emissions.
- **Resource Efficiency:** They promote resource efficiency by utilizing sustainable materials and innovative design practices.
- **Quality of Life:** Sustainable architecture enhances the quality of life for occupants through improved indoor air quality, natural lighting and energy-efficient systems.
- **Economic Benefits:** Sustainable buildings often have lower operational costs, which can lead to economic savings over time.
- **Resilience:** They contribute to building resilience against climate-related challenges, such as extreme weather events.
- **Education:** Iconic sustainable buildings educate the public about sustainable design principles and encourage more sustainable construction practice.

Ultimately, the 100 Iconic Sustainable Buildings showcase the potential for environmentally responsible design and construction and can serve as powerful sources of inspiration for a global shift towards sustainable living practices.

WHAT ARE ICONIC & SUSTAINABLE BUILDING FEATURES?

Iconic sustainable buildings are groundbreaking buildings that signal the potential for market transformation with multiple of the following characteristics:

Net-Zero or Net-Positive Buildings

Low Energy Cooling or Heating

Waste and Water Treatment

Optimized Energy Efficiency

Renewable Energy & Energy Storage

Innovative Passive and Adaptive Design

Low Cost and Affordable Sustainability

Sustainable Materials and Natural Solutions

A sustainable built environment is at the heart of climate-positive and resilient communities. By celebrating iconic sustainable buildings and disseminating their experiences, we contribute to a greener future for generations to come.

DAMILOLA OGUNBIYI

CEO and Special Representative of the UN Secretary-General for Sustainable Energy for All and Co-Chair of UN-Energy

ARGENTINA

BUILDING NAME	LOCATION	BUILDING TYPE
Altman Eco Office	Buenos Aires	Office
Ciudad Casa de Gobierno	Buenos Aires	Office
La Dianita	Mar de Plata	Residential
MeMo House	Buenos Aires	Residential

Altman Eco Office

BUENOS AIRES, ARGENTINA OFFICE

Photo courtesy of USGBC

RENEWABLE ENERGY

On-site solar photovoltaic renewable energy to generate electricity.

EFFICIENT WATER USE

Graywater reuse, rainwater harvesting, and water-efficient landscaping save 50% of water use.

EFFICIENT COMFORT

State-of-the-art air central air conditioning with heat recovery and independent temperature control ensure indoor air quality.

ENERGY EFFICIENT

30% less energy use through energy efficient equipment, LED lights, design innovations, and high-performance windows.

LEED PLATINUM CERTIFICATION

Argentina's first LEED Platinum building

Ciudad Casa de Gobierno

BUENOS AIRES, ARGENTINA OFFICE

INNOVATIVE DESIGN

A four-story-high atrium with glass façade allows natural light. Patios and shaded walkways echo the outside park.

INNOVATIVE VENTILATION

The open floor plate design and chilled beam system enable natural cross ventilation and makes best use of external air temperature.

EFFICIENT INSULATION

Built with materials that are efficient in insulating and maintaining a constant temperature to reduce the need of heating and cooling.

THERMAL COMFORT

The flowy canopy extend in an overhang to shade the entrance plaza and façade. The thermal mass of the soffit overhang along with chilled beams allow to regulate indoor temperature.

LEED GOLD CERTIFICATION

AMERICAN PLANNING ASSOCIATION 2016 AWARD FOR EXCELLENCE IN SUSTAINABILITY

Photo courtesy of Architectour

La Dianita

MAR DE PLATA, ARGENTINA RESIDENTIAL

EFFICIENT FAÇADE

Concrete walls with 18 cm projected cellulose insulation and Passivhaus certified aluminum windows with triple glazing.

EFFICIENT HEATING

Heat pump with heat recovery installed to efficiently heat the whole house

EFFICIENT VENTILATION

Heat-recovery ventilation system that allows efficient ventilation during hot or cold seasons, with fresh air and uniform indoor temperatures.

INTEGRATION WITH THE ENVIRONMENT

Its large windows integrate the interior with the exterior.

Photo courtesy of Energiehaus

PASSIVHAUS CERTIFICATION

First Passivhaus certification in Argentina

MeMo House

BUENOS AIRES, ARGENTINA **RESIDENTIAL**

INTEGRATED DESIGN

Three-dimensional garden that blends in with its surroundings.

ENERGY EFFICIENCY

Orientation of the building and windows maximize natural sunlight and ventilation. DVH-type glass=insulated windows reduce thermal transfer.

RENEWABLE ENERGY

Solar panels supply electricity to power heating, ventilation and air-conditioning.

EFFICIENT WATER USE

Uses rainwater and recirculates wastewater for irrigation of native vegetation.

Passive building

Photo courtesy of Dezeen

La Dianita in Mar de Plata, Argentina (page 1

The DIANITA stands out for its environmental commitment related to almost zero consumption and large windows that integrate the interior with the exterior. Thermal insulation with biological materials are noteworthy

PAOLO E. MASSACESI

Architect and owner of La Dianita

AUSTRALIA

BUILDING NAME	LOCATION	BUILDING TYPE
Burwood Brickworks	Middleborough	Retail
Sustainable Buildings Research Centre	New South Wales	Community
Council House 2	Melbourne City	Office
Pixel Building	Melbourne City	Office
Quay Quarter Tower	Sydney	Office
Central Barangaroo Precinct	Sydney	Community
One Central Park	Sydney	Residential

Burwood Brickworks

MIDDLEBOROUGH, AUSTRALIA RETAIL

RECYCLED MATERIALS

Built with sustainably sourced, reclaimed and recycled materials for a decreased embodied carbon.

RENEWABLE ENERGY

A system of 3,300 solar panels on the rooftop generates more electricity than that consumed over the year.

WATER TREATMENT

An innovative water management system captures and uses all rainwater and includes greywater in a closed loop treatment system.

INNOVATIVE DESIGN

The sawtooth roof provides light, water capture, solar harvesting and natural ventilation. It also hosts an urban farm and restaurant.

Photo courtesy of MDGLA

6 GREEN STAR DESIGN AWARD

PETAL CERTIFICATION FROM THE LIVING BUILDING CHALLENGE

Sustainable Buildings Research Centre

NEW SOUTH WALES, AUSTRALIA COMMUNITY

INNOVATIVE DESIGN

Designed to restore indigenous vegetation and include urban agriculture.

WATER TREATMENT

Rainwater is captured, and waste-water is treated in a black water system with natural processes and then used for irrigation.

EFFICIENT LIGHTING

Natural daylight combined with sophisticated lighting control results in minimal artificial lighting use.

RENEWABLE ENERGY

Nearly 600 solar PV panels generate electricity on site coupled with a solar thermal system.

EFFICIENT VENTILATION

95% of the premises ventilated naturally, and building management systems connected to a weather station on the roof allows optimal operation.

PETAL CERTIFICATION FROM THE LIVING BUILDING CHALLENGE

6-STAR GREEN STAR RATING FOR EDUCATION DESIGN V1

AUSTRALIAN INSTITUTE OF ARCHITECTS (AIA) NSW MILO DUNPHY AWARD FOR SUSTAINABLE ARCHITECTURE

Photo courtesy of ABC News

Council House 2

MELBOURNE CITY, AUSTRALIA OFFICE

EFFICIENT WATER USE

Black water treatment together with rainwater collection, supplies non-drinking water.

RENEWABLE ENERGY

Solar photovoltaic panels and wind turbines are installed on the roof.

EFFICIENT LIGHTING

Lower light levels supported by task lights save 2/3 of typical energy use.

EFFICIENT COOLING

Thermal mass, natural ventilation, chilled panels, cooling towers with night heat purge reduces cooling demand by 20%.

INNOVATIVE INSULATION

The glass windows and external façade allow to block or let through light from the outside automatically. Vertical ducts deliver 100% outside air supply floor by floor.

6 STAR GREEN STAR RATING BY THE GBC OF AUSTRALIA

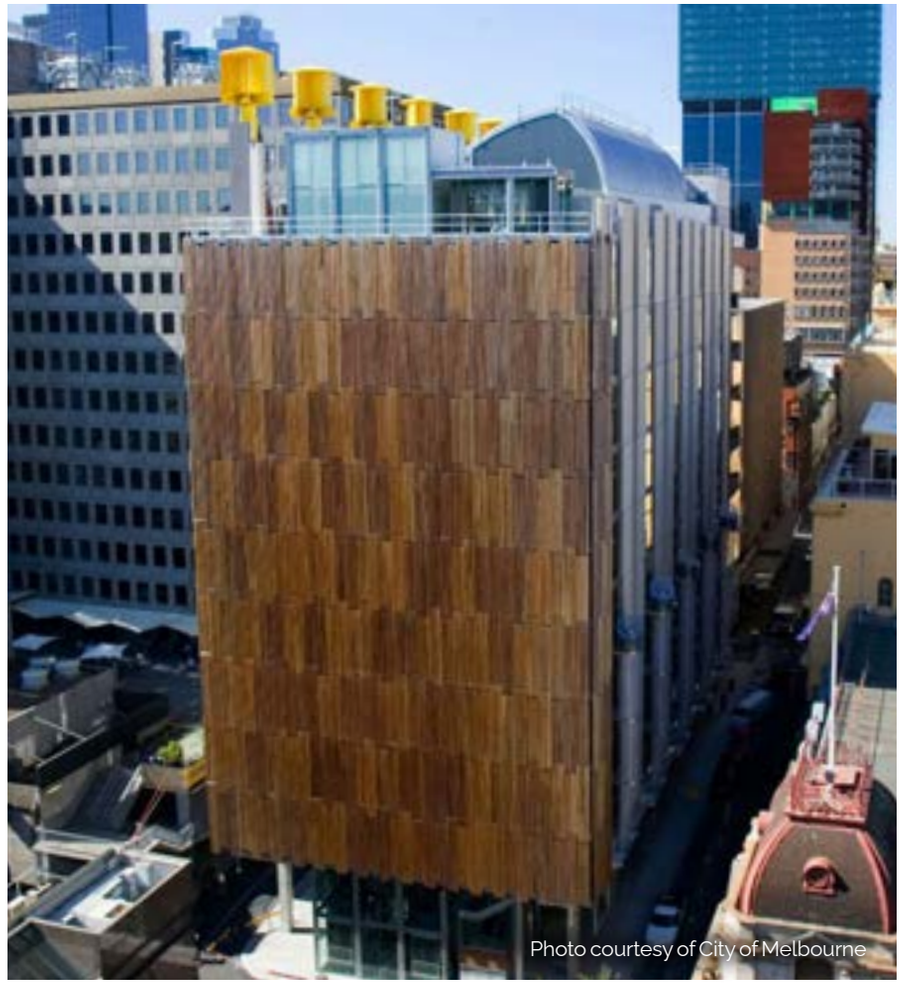


Photo courtesy of City of Melbourne

Pixel Building

MELBOURNE CITY, AUSTRALIA OFFICE

SUSTAINABLE RESOURCES

All power and water are generated on site.

LOW CARBON MATERIALS

Construction used special concrete with minimum carbon content.

EFFICIENT WATER USE

The building's roof includes a vegetation cover with a rainwater capture system. A wastewater treatment system recirculates water for its facilities.

RENEWABLE ENERGY

Rooftop solar panels are coupled with solar trackers to maximize electricity generation. Three innovative vertical wind turbines do not need electricity to start up.

INNOVATIVE FAÇADE

Translucent recycled panels make up a ventilated façade. Double layer glass panels provide thermal isolation and allow sunlight. Smart controls open windows on demand at night for passive cooling.

BEST OF THE BEST AWARD IN THE 2011 BPN SUSTAINABILITY AWARDS

LEED BD+C: NEW CONSTRUCTION V3 PLATINUM CERTIFICATION

6-STAR GREEN STAR RATING BY THE GBC OF AUSTRALIA

Photo courtesy of Buildpass

Quay Quarter Tower

SYDNEY, AUSTRALIA OFFICE

ADAPTIVE DESIGN

The world-class retrofit of an existing commercial tower retained 65% of original floorplates and 98% of original walls and core, saving 12,000 tonnes of embodied carbon.

INNOVATIVE FAÇADE

The façade's orientation, high-performance glazing and sunshades reduce heat and glare, improving' comfort and curbing air-conditioning use.

RENEWABLE ENERGY

100% renewable electricity procured from solar farms.

ENERGY EFFICIENT

HVAC system is coupled with smart building technology to deliver fresh, clean air efficiently.

6 STAR GREEN STAR OFFICE DESIGN V3 BY GBC OF AUSTRALIA

5.5 STAR NABERS OFFICE BASE BUILDING ENERGY RATING

4 STAR NABERS OFFICE BASE BUILDING WATER RATING

2022 WORLD BUILDING OF THE YEAR AWARD

WELL PLATINUM CERTIFICATION

Photo courtesy of Schindler Group

Central Barangaroo Precinct

SYDNEY, AUSTRALIA COMMUNITY

CARBON NEUTRAL

On-site renewable energy supplies all electricity. Fuel used on-site in transport is offset with a socially responsible carbon offset program.

WATER POSITIVE

Wastewater is treated for irrigation, state-of-the-art water storage tanks capture and re-use rainwater and water-efficient appliances reduce the need for purchased water.

ZERO WASTE

Waste is sorted into 19 categories in the centralized waste storage centre, diverting over 80% of all operational waste from landfill.

EFFICIENT COOLING

A district cooling plant uses 'free cooling' from Sydney harbour to provide energy-efficient air-conditioning.

CLIMATE ACTIVE INITIATIVE
CARBON NEUTRAL
6-STAR GREEN STAR RATING BY THE GBC OF AUSTRALIA
WELL COMMUNITY CERTIFICATION

Photo courtesy of 芳蘭 徐芳蘭

One Central Park

SYDNEY, AUSTRALIA RESIDENTIAL

PASSIVE DESIGN

Green roofs and vertical gardens with over 250 species of Australian plants shield apartments during summer while allowing free heat and sunlight in winter.

EFFICIENT WATER USE

Recycled water supplies 100% of irrigation and air-conditioning water needs. The system also allows sewer mining.

EFFICIENT SYSTEMS

The precinct includes tri-generation of power, heating and cooling.

ENERGY EFFICIENT

The complex requires 25% less energy compared to a conventional building of its size.

ADAPTIVE DESIGN

The design made adaptive re-use of buildings.

5-STAR GREEN STAR MULTI-UNIT RESIDENTIAL DESIGN V1 BY THE GBC OF AUSTRALIA

2014 LEAF AWARDS WINNER

Photo courtesy of OCULUS

BRAZIL

BUILDING NAME	LOCATION	BUILDING TYPE
Camisas Polo Salvador	Salvador	Manufacturing
Idea Bagé	Porto Alegre	Residential
Community Center Camburi	São Paulo	Community
Hospital Erastinho	Curitiba	Healthcare
Residência FM136	São Paulo	Residential
Museum of Tomorrow	Rio de Janeiro	Community
Instituição Adventista Sul Brasileira de Educação	Curitiba	Community

Camisas Polo Salvador

SALVADOR, BRAZIL MANUFACTURING

NET-ZERO ENERGY

100% energy self-sufficient through both high energy efficiency and renewable energy generation.

RENEWABLE ENERGY

104 rooftop solar photovoltaic panels offset all energy used.

SUSTAINABLE PROCESSES

Over 50 sustainable actions, ranging from manufacturing processes to final products, and including energy efficiency, water harvesting, waste management, and reverse logistics.

GBC BRASIL ZERO ENERGY CERTIFICATION

First building with GBC Brasil Zero Energy certification

Photo courtesy of World Green Building Council

Idea Bagé

PORTO ALEGRE, BRAZIL RESIDENTIAL

RENEWABLE ENERGY

54 solar photovoltaic panels supply all building's common area and 30% of apartments' energy needs. A central water heating uses solar thermal energy.

EFFICIENT WATER USE

Ecological faucets and showers reduce water use up to 60%. Rainwater and condensation from air-conditioning units are used for irrigation.

ENERGY EFFICIENT

Exterior wall insulation eliminates thermal bridges and saves up to 40% of cooling demand.

INTEGRATED DESIGN

IoT applications measure water, energy and gas consumption and control building systems.

INNOVATIVE MODEL

A compensation programme turns surplus energy into electricity credits that customers can use over a period of up to 5 years.

LEED PLATINUM CERTIFICATION

Photo courtesy of Noblesse

Community Center Camburi

SÃO PAULO, BRAZIL COMMUNITY

INNOVATIVE DESIGN

Built by and for the local low-income community, with flexible design that can be adapted to multiple uses.

SUSTAINABLE MATERIALS

Built with local and natural materials like bamboo and earth to minimize its carbon footprint, used local know-how and positively impacted the local economy.

INNOVATIVE VENTILATION

The orientations catch sea wind for natural ventilation. Air flow is optimized through a raised roof and by avoiding perpendicular walls.

Community involvement and participatory design

Photo courtesy of Share Your Green Design

Hospital Erastinho

CURITIBA, BRAZIL HEALTHCARE

EFFICIENT INSULATION

Efficient insulation limits the need for air-conditioning and reduces energy needs by 25%.

GREEN TECHNOLOGIES

Solar photovoltaics generate 100% of energy needs for the oncopediatric centre.

ENERGY EFFICIENT

Efficient lighting fixtures and energy-efficient cooling help reduce its energy demand.

INNOVATIVE DESIGN

Its energy- and resource-efficient design ensures thermal and acoustic comfort.

LEED HEALTHCARE CERTIFICATION
WELL BUILDING

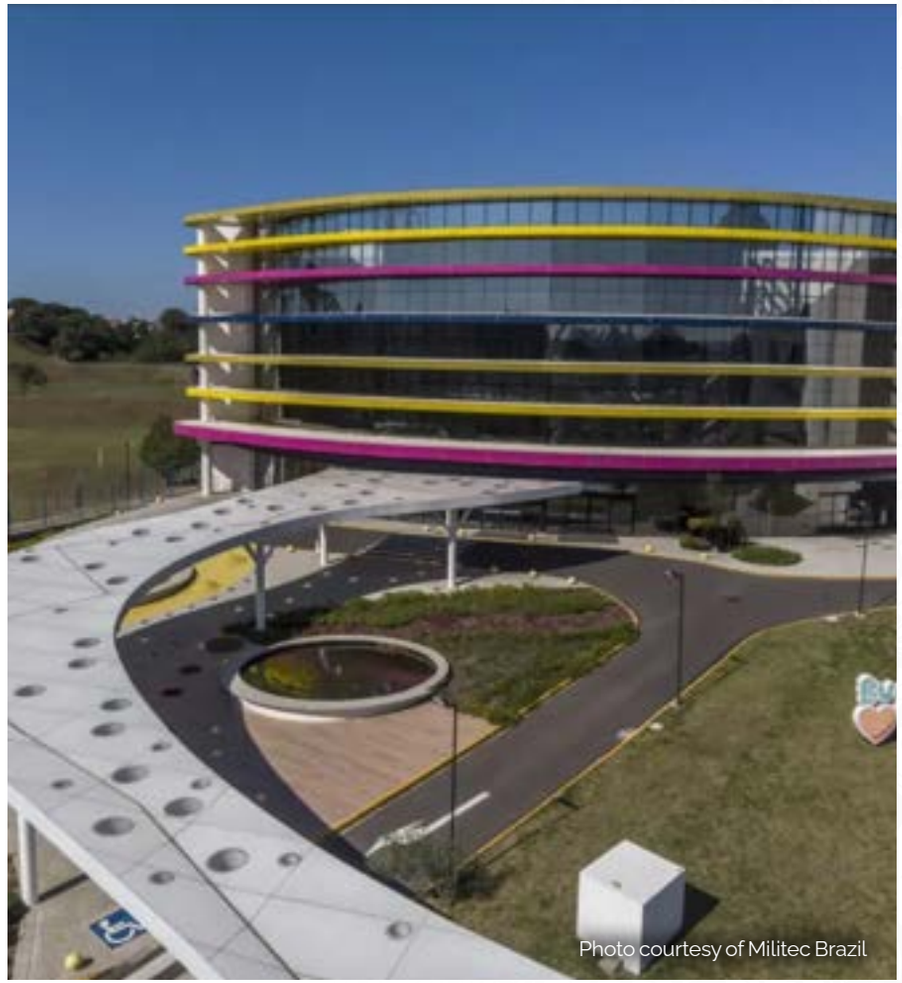


Photo courtesy of Militec Brazil

Residência FM136

SÃO PAULO, BRAZIL RESIDENTIAL

RENEWABLE ENERGY

70% of water heating is supplied by solar thermal sources, and over 93% of electricity needs are met with on-site renewable energy generation.

INNOVATIVE FAÇADE

Built with a mix of concrete and laminated wood for thermal regulation.

SUSTAINABLE MATERIALS

Building materials reduce carbon footprint, with 53% of the wood used certified.

WASTE REDUCTION

Waste management diverts 100% of waste from landfill.

ENERGY EFFICIENT

75% less energy consumption compared to conventional construction.

LEED PLATINUM CERTIFICATION

Photo courtesy of JAA Arquitectos

Museum of Tomorrow

RIO DE JANEIRO, BRAZIL COMMUNITY

INNOVATIVE COOLING

Air-conditioning system takes cold water as a heat sink from the bottom of nearby Guanabara Bay for more efficient cooling.

RENEWABLE ENERGY

Adjustable, fin-like solar panels add to the building's neo-futuristic aesthetic, track the sun's movement and increase electricity generation.

INNOVATIVE DESIGN

Distinctive for its cantilevered roof, reflective pools and skeletal structure.

LEED GOLD CERTIFICATION

Photo courtesy of Itinari

Instituição Adventista Sul Brasileira de Educação

CURITIBA, BRAZIL COMMUNITY

NET-ZERO ENERGY

45 buildings were operating at net-zero energy by 2022, and the remaining 33 are set to achieve certification by 2030.

ENERGY EFFICIENCY

Deep green energy renovations are equipping all 78 buildings on campus with high-efficient HVAC, lighting and equipment.

RENEWABLE ENERGY

On-site renewable energy systems are being installed in all existing buildings.

ADVOCACY

Nearly-zero energy buildings are taught in the curriculum, schools are used as living labs, and the community is engaged to raise awareness of financial and environmental benefits.

GBC BRASIL ZERO ENERGY CERTIFICATION

Photo courtesy of World Green Building Council

CANADA

BUILDING NAME	LOCATION	BUILDING TYPE
Vancouver Convention Center	Vancouver, British Columbia	Community
Mohawk College Joyce Centre For Partnership & Innovation	Hamilton, Ontario	Community
Centre for Interactive Research on Sustainability	Vancouver, British Columbia	Office
EchoHaven	Calgary, Alberta	Residential
825 Pacific Artist Hub	Vancouver, British Columbia	Office
Telus Garden	Vancouver, British Columbia	Retail
Deloitte Tower	Montreal, Quebec	Office
Bibliothèque du Boisé	Montreal, Quebec	Community
Fogo Island Inn	Fogo Island, Newfoundland	Hospitality

Vancouver Convention Center

VANCOUVER, BRITISH COLUMBIA, CANADA COMMUNITY

NATURAL SOLUTIONS

A six-acre living roof with over 400,000 indigenous plants and grasses acts as an insulator, reducing heat gains in the summer and heat losses in the winter.

EFFICIENT WATER USE

Grey and black water is treated and recycled to feed washrooms for toilet flushing and rooftop irrigation during warmer weather.

ENERGY EFFICIENT

Heating and cooling system uses seawater to produce cooling during warmer months and heating in cooler months.

GREEN KITCHEN

A 'scratch' kitchen uses primarily fresh, local and seasonal ingredients, reducing transport energy consumption.

PASSIVE DESIGN

Natural light and passive ventilation throughout the facility

LEED PLATINUM CERTIFICATION
World's First Double LEED Platinum Convention Centre

Photo courtesy of Construction Canada

Mohawk College Joyce Centre for Partnership & Innovation

HAMILTON, ONTARIO, CANADA COMMUNITY

ENERGY POSITIVE

The facility is fully electrified and 1,980 solar photovoltaic panels generate more energy than consumed.

ENERGY EFFICIENT

The air-tight envelope, coupled with a green and reflective rooftop, minimize heating and cooling demand.

EFFICIENT WATER USE

Smart water conservation technologies harvest rainwater. Low flow fixtures minimize water use.

OCCUPANT BEHAVIOUR

By making users aware of energy consumption, the centre promotes efficient behaviour, collaboration and accountability.

RENEWABLE SYSTEMS

A large-scale geothermal energy system supplies heating and cooling.

NATURAL LIGHTING

Large, insulated windows and a central light well are coupled with sensor-controlled LED lighting.

CAGBC NET ZERO CARBON DESIGN & PERFORMANCE CERTIFIED

Photo courtesy of Toronto Metropolitan Department of Architectural Science

Centre for Interactive Research on Sustainability

VANCOUVER, BRITISH COLUMBIA, CANADA OFFICE

SUSTAINABLE MATERIALS

The wood structure stores carbon, reducing the carbon footprint by almost 90% compared to average buildings.

INNOVATIVE FAÇADE

The façade provides shading and reduces cooling demand. The massing contributes to 100% natural daylight and ventilation.

EFFICIENT WATER USE

Rainwater collection and waste-water purification with solar aquatics biofiltration supply 100% of water needs.

INTEGRATED DESIGN

Passive environmental strategies are maximized, including roof garden houses with local flora and fauna.

RENEWABLE ENERGY

A mix of heat exchangers, solar photovoltaics and geothermal systems supply clean energy.

CAGBC LEED PLATINUM CERTIFICATION

Photo courtesy of ArchDaily

EchoHaven

CALGARY, ALBERTA, CANADA RESIDENTIAL

EFFICIENT INSULATION

Heating load reduced by approximately 80% with advanced insulation and triple-glazed windows.

NET-ZERO EMISSIONS

Homes are built with recycled materials, have achieved net-zero emissions and preserved 60% of the natural landscape.

EFFICIENT SYSTEMS

Fresh air provided through heat recovery ventilation.

EFFICIENT WATER USE

Rainwater collection and use reduces purchased water demand. Natural stormwater system supports water retention.

RENEWABLE ENERGY

Homes are fully electrified, with solar photovoltaic panels on fronts and tops, reducing grid power use by 50% compared to average homes.

COMMUNITY ACTION

Residents work together to create a sustainable lifestyle.

ILFI ZERO ENERGY

Photo courtesy of Construction Canada

825 Pacific Artist Hub

VANCOUVER, BRITISH COLUMBIA, CANADA OFFICE

SUSTAINABLE MATERIALS

Built with a mix of sustainable materials in its structure that help to reduce its carbon footprint

INNOVATIVE VENTILATION

Energy recovery ventilator with sensible heat recovery optimizes air quality and efficiency.

NET-ZERO EMISSIONS

The building is fully electrified to achieve near-zero operational emissions.

ENERGY-USE DATA

Real-time energy-use data can inform the creation of future sustainable urban buildings.

EFFICIENT SYSTEMS

Heating and cooling provided simultaneously by zone through variable refrigerant flow systems. Hot water provided by air-source heat pumps that also act as a backup to the heating system.

PASSIVHAUS CERTIFICATION

Photo courtesy of IBI Group

Telus Garden

VANCOUVER, BRITISH COLUMBIA, CANADA RETAIL

PASSIVE DESIGN

Green roofing system together with 300 solar photovoltaic panels reduce the heat island effect.

EFFICIENT LIGHTING

Motion-sensitive, energy-efficient lighting system provides light only when needed.

EFFICIENT SYSTEMS

Smart building system that manages all the systems to optimize fresh air.

EFFICIENT WATER USE

Rainwater harvesting system to reduce purchased water for gardening.

EFFICIENT HEATING

Heating system recovers heat from neighbouring tele-communications building for air and water heating.

LEED PLATINUM CERTIFICATION
VANCOUVER'S LARGEST SOLAR PANEL ARRAY

Photo courtesy of Henriquez Partners Architects

Deloitte Tower

MONTREAL, QUEBEC, CANADA OFFICE

INNOVATIVE INSULATION

An innovative curtainwall design with lightly tinted gray vision glass on 80% of perimeter walls allows significant daylight while controlling heat exchange.

WATER EFFICIENCY

47% water reduction through low-flow water fixtures coupled with use of rooftop rainwater harvesting for irrigation.

ENERGY EFFICIENT

Designed to use 38% less energy, including through all artificial lighting changed to LED lighting.

ACTIVE LIVES

197 bicycle racks and 15 showers promote an active lifestyle and sustainable options for getting to work.

LEED PLATINUM CERTIFICATION
First LEED Platinum Office Building in Montreal

Photo courtesy of B+H Architects

Bibliothèque du Boisé

MONTREAL, QUEBEC, CANADA COMMUNITY

EFFICIENT LIGHTING

75% of floor area has access to natural light to promote health and well-being of users and reduce energy usage.

SUSTAINABLE MATERIALS

Built with locally sourced, low-emitting and recycled materials.

INNOVATIVE HEATING

Innovative passive heating system redistributes the heat collected in a glass prism. Underfloor low-flow ventilation supplies conditioned fresh air.

NATURAL SOLUTIONS

Existing trees were preserved, over 100 more trees were planted, and indigenous plants are featured on the exterior. Stormwater recovery system allows water source to maintain a nearby wetland.

LEED PLATINUM CERTIFICATION
GREEN BUILDING AWARD 2017

Photo courtesy of Architect Magazine

Fogo Island Inn

FOGO ISLAND, NEWFOUNDLAND, CANADA HOSPITALITY

SUSTAINABLE MATERIALS

Regenerative principles embodied in the design. All building materials – as well as furniture - are made of natural materials and locally-sourced.

INNOVATIVE INSULATION

The windows are triple-glazed and prevent drafts and sudden temperature changes.

INNOVATIVE VENTILATION

The air inside the property is kept healthier, cleaner, and more comfortable by heat-recovery ventilators.

EFFICIENT WATER USE

Rainwater is captured to reuse in toilets, laundry and kitchen, and wastewater is ecologically treated.

RENEWABLE HEAT

Hot water is supplied by thermal roof panels and high-efficiency wood-fired boilers.

Passive building

Photo courtesy of Bloomberg

CHINA

BUILDING NAME	LOCATION	BUILDING TYPE
Construction Industry Council Zero Carbon Building	Hong Kong	Community
Passive House Technology and Experience Center	Qingdao	Community
Shanghai Tower	Shanghai	Office

Construction Industry Council Zero Carbon Building

HONG KONG, CHINA COMMUNITY

RENEWABLE ENERGY

An expansive array of photovoltaic solar panels coupled with bio-diesel tri-generation, to generate more energy than needed on an annual basis.

EFFICIENT FAÇADE

Climate-responsive form, orientation, layout, deep overhang, shading, high performance glazing, and insulated roof.

SUSTAINABLE MATERIALS

Constructed with recycled materials and timber. Construction emphasized resource conservation and waste reduction.

PASSIVE DESIGN

Natural ventilation without air-conditioning, natural daylight and solar shading.

EFFICIENT SYSTEMS

25% energy savings from efficient active systems with smart control.

BEAM PLUS PLATINUM CERTIFICATION
First net-zero carbon building in Hong Kong

Photo courtesy of ArchDaily

Passive House Technology and Experience Center

QINGDAO, CHINA COMMUNITY

RENEWABLE ENERGY

100% renewable energy sources for electricity supply, including solar photovoltaic.

EFFICIENT HEATING

Efficient geothermal heat pumps combined with heat-recovery ventilation for thermal comfort and dehumidification .

ENERGY EFFICIENT

LED lighting, high performance insulation, windows and airtight envelope.

MONITORING SYSTEM

Access real time data that support future operation and optimization.

PASSIVHAUS CERTIFICATION
PASSIVHAUS AWARD 2021

Photo courtesy of Austrian Green Planet Building

Shanghai Tower

SHANGHAI, CHINA OFFICE

RENEWABLE ENERGY

270 wind turbines spinning at the top of the tower – the world's tallest turbines generate around 10% of the building's electricity.

INNOVATIVE VENTILATION

The building is wrapped in two layers of glass for natural cooling and ventilation.

EFFICIENT HEATING AND COOLING

Energy-efficient HVAC systems and smart sensors.

NATURAL SOLUTIONS

Designed with 21 gardens distributed on each of the nine zones that help to regenerate the air.

EFFICIENT WATER USE

The building collects rainwater and re-uses waste-water, has a combined cooling and heating power system.

EFFICIENT POWER PLANT

Cogeneration onsite power plant generates heating and electricity.

LEED PLATINUM CERTIFICATION

Photo courtesy of Gensler

EUROPEAN UNION

BUILDING NAME	LOCATION	BUILDING TYPE
Kundmanngasse 21	Vienna, Austria	Office
Haltia	Espoo, Finland	Community
One Floreasca City	Bucharest, Romania	Residential
Entrepatios Las Carlinas	Valladolid, Spain	Residential
Edificio Lucia	Madrid, Spain	Community
Skapaskolan	Huddinge, Sweden	Community
Sara Kulturhus	Skelleftea, Sweden	Community
Floating Office	Rotterdam, The Netherlands	Office
The Edge	Amsterdam, The Netherlands	Office
Hotel Jakarta	Amsterdam, The Netherlands	Hospitality

Kundmanngasse 21

VIENNA, AUSTRIA OFFICE

INNOVATIVE VENTILATION

Ventilation is CO2-controlled and with a mechanical ventilation system with heat recovery - demand-controlled air flow volumes via CO2 sensors - reduces the energy demand for heating and cooling.

INNOVATIVE HEATING

District heating supplies a heating and cooling ceiling or the ventilation system. The hot water is decentralized via under-table storage tanks.

ENERGY EFFICIENT

Efficient curtain-wall façade with wind-protected exterior shading reduces solar heat gain in the summer. Efficient building services include demand-driven elevator and efficient workstations.

RENEWABLE ENERGY

750m^2 PV system on rooftop supplies on-site energy and together with reduced primary energy demand it enables the EnerPHit Plus standard.

PASSIVHAUS CERTIFICATION
PASSIVHAUS AWARD 2021

Photo courtesy of Nextroom

Finnish Nature Centre Haltia

ESPOO, FINLAND COMMUNITY

SUSTAINABLE MATERIALS

Built from cross laminated solid wood elements (CLT). Façade made of sodium silicate pressure impregnated wood.

INNOVATIVE DESIGN

Holistically designed to suit the Nordic climate, taking advantage of the characteristics of the building site.

WATER EFFICIENCY

Water-saving fixtures and landscaping implemented to reduce water consumption to reduce water consumption and soil leaching.

RENEWABLE ENERGY

Solar photovoltaic panels and solar collectors together with geothermal heat and cooling provide 80% of energy.

ENERGY EFFICIENT

Advanced insulation and moisture management, adaptable lightning, automation and exhibition technology, heat and cooling recovery system.

AWARD FOR SUSTAINABLE DEVELOPMENT FROM THE EUROPEAN MUSEUM OF THE YEAR AWARDS 2015

Photo courtesy of Lahdelma & Mahlamäki architects

One Floreasca City

BUCHAREST, ROMANIA RESIDENTIAL

ENERGY EFFICIENT

The buildings have energy-efficient systems installed to reduce their energy intensity.

SUSTAINABLE MATERIALS

Built with sustainable materials to reduce their overall carbon footprint.

INCLUSIVE DESIGN

The towers offer multiple green spaces that help reduce the heat island effect.

INNOVATIVE VENTILATION

Because of the innovative design of the façade, the apartment buildings are cross ventilated while offering views of the nearby lake and green spaces.

LEED PLATINUM CERTIFICATION
GREEN HOME CERTIFICATION

Photo courtesy of Allied Engineers

Entrepatios Las Carolinas

MADRID, SPAIN RESIDENTIAL

NET-ZERO CARBON

The building doesn't emit CO2 and renewable electricity is provided by 90 photovoltaic panels and a 100% renewable electricity contract.

ENERGY EFFICIENT

Natural ventilation and heat pump supplies heating and cooling.

PASSIVE DESIGN

Optimized orientation and location to reduce energy usage in lighting.

EFFICIENT INSULATION

Thermal insulation of the building allows it to remain cool or hot with minimum energy usage.

LIFE CYCLE ASSESSMENT

The building life cycle has been analyzed to evaluate its environmental impact.

Passive building

Photo courtesy of GEOH Passivhaus

Edificio Lucia

VALLADOLID, SPAIN COMMUNITY

NET-ZERO BUILDING

Cogeneration with biomass from surrounding areas and photovoltaic façade systems to produce 100% of needed electricity.

ENERGY EFFICIENT

The bioclimatic design provides 40% energy savings. A geothermal pumping well system maintains comfort.

EFFICIENT LIGHTING

For areas that need artificial lighting the building has efficient lighting technologies.

EFFICIENT WATER USE

Rooftop tanks collect rainwater that is filtered through its vegetal cover, to supply flushes.

LEED CERTIFIED
GBCE A CERTIFIED

Passive building

Photo courtesy of Constructora San Jose

Skapaskolan

HUDDINGE, SWEDEN COMMUNITY

MULTI-USE ROOF

Rooftop accommodates a photovoltaic system, a play-ground and a green roof.

EFFICIENT HEATING

Heating is provided through a combination of the ventilation system and district heating. The exhaust heat from the kitchen is also transferred to intake air to help heat the building. Most importantly, well-insulated windows, doors and walls reduce the overall need for heating.

INNOVATIVE ACOUSTICS

Acoustic design ensures sound quality despite the open plan. The school is also designed to be shoe free, which improves sound quality. No shoes also means that softer materials can be used, improving sound quality even more with minimized dirt and damage.

SUSTAINABLE MATERIALS

The building was prefabricated off-site to reduce waste and is built with regional, sustainably sourced materials to reduce its carbon footprint.

PASSIVHAUS CERTIFICATION
PASSIVHAUS AWARD 2021

Photo courtesy of Mattias Hamrén Photography

Sara Kulturhus

SKELLEFTEA, SWEDEN COMMUNITY

SUSTAINABLE MATERIALS

One of the tallest timber buildings in the world, built with local sustainably sourced wood to reduce its life-cycle carbon footprint.

RENEWABLE ENERGY

A geothermal heat pump and 1,200 sq m of rooftop solar panels provide most of the power, with the remainder procured from renewable sources.

INNOVATIVE INSULATION

The building is well insulated, preventing any noise coming in and maintaining a comfortable temperature throughout the year.

INNOVATIVE DESIGN

The large windows allow natural light to come in, reducing the need for artificial lighting.

SIDE BY SIDE WINNING ARCHITECTURAL PROPOSAL FROM WHITE ARKITEKTER

Photo courtesy of ArchDaily

Floating Office

ROTTERDAM, THE NETHERLANDS OFFICE

SUSTAINABLE MATERIALS

Mostly built with cross-laminated timber that allows the building to reduce its overall carbon footprint.

RENEWABLE ENERGY

Fitted with an array of solar panels that help reduce its energy intensity.

INNOVATIVE SYSTEMS

The building uses the water of the harbour to heat and cool its premises as needed.

INNOVATIVE DESIGN

If needed, the whole building can be dismounted and moved to another location without any additional costs.

LOW-IMPACT

The floating structure itself minimizes the need for traditional land-based foundations, potentially reducing disruption to local ecosystems.

BREAM EXCELLENCE RATING

Photo courtesy of Vanguardia

The Edge

AMSTERDAM, THE NETHERLANDS OFFICE

SMART CONTROLS

Occupants control the building through an app according to daylight, temperature, infrared and motion detectors.

ENERGY EFFICIENT

LEDs are powered by a "digital ceiling" with 80% energy savings over traditional lighting.

RENEWABLE ENERGY

The roof and southern wall of the building host solar photovoltaic panels.

INNOVATIVE DESIGN

The large windows in the atrium allow natural light, reducing the need for artificial lighting.

EFFICIENT SYSTEMS

Hybrid ventilation system that relies on natural airflow and mechanical systems, as well as heat-recovery technology to minimize energy waste.

EFFICIENT LIGHTING

LED lighting is used throughout the building, and it can be adjusted based on occupancy and the availability of natural light.

BREAM EXCELLENCE RATING: 98.3% SUSTAINABILITY SCORE
"Greenest and most intelligent building of the world"

Photo courtesy of Architectural Digest

Hotel Jakarta

AMSTERDAM, THE NETHERLANDS HOSPITALITY

SUSTAINABLE MATERIALS

Built mainly with local sustainably sourced wood to reduce its overall carbon footprint.

RENEWABLE ENERGY

361 building integrated solar photovoltaic panels to supply over 87kW of electricity.

NO SINGLE-USE PLASTIC

Property is single-use plastic free. Waste is separated and recycled or composted.

EFFICIENT WATER USE

Rainwater is collected and used for irrigation of the subtropical garden.

SUSTAINABLE DINING

Restaurants emphasize locally sourced and organic ingredients, reducing carbon footprint of food production and transportation.

NATURAL SOLUTIONS

Landscaped with plants that require minimal water and maintenance, indoors and outdoors.

BREAM EXCELLENCE RATING

Photo courtesy of Baunetz Wissen

Photo courtesy of Österreichische Sozialversicherun

FRANCE

BUILDING NAME	LOCATION	BUILDING TYPE
Tour Elithis Dijon	Dijon	Office
Origine Headquarters	Nanterre	Office
Tour Elithis Danube	Strasbourg	Residential
IntenCity	Grenoble	Office
Saint-Joseph Media Library	St. Joseph, Reunion Island	Community
BNP Paribas #Curve Building	St Denis	Office
Tour Bois-le-Prêtre	Paris	Residential
Collège Samuel Paty	Valenton	Community

Tour Elithis Dijon

DIJON, BOURGOGNE, FRANCE OFFICE

RENEWABLE ENERGY

330 roof top solar panels designed to generate more energy than the building consumes.

COST EFFECTIVE

Standard cost of construction to achieve 40-50 times less energy consumption than average buildings.

INNOVATIVE DESIGN

Solar shield blocks excess heat gain while still allowing natural light.

DATA-DRIVEN

Energy demand tracked through 1,600 sensors.

SUSTAINABLE MATERIALS

The tower is made of wood and recycled insulation.

NO AIR-CONDITIONING

Building designed with no mechanical cooling.

ALLIANCE-HQE E+C-
WORLD'S FIRST ENERGY POSITIVE OFFICE TOWER

Photo courtesy of Com'Air / Arte Charpentier Architectes

Origine Headquarters

NANTERRE, FRANCE OFFICE

RENEWABLE ENERGY

100% renewable energy with solar photovoltaics, geothermal energy and green electricity contract.

SUSTAINABLE MATERIALS

Bioclimatic architecture, wood framework and low carbon concrete to reduce its carbon footprint.

SMART BUILDING

Smart electrical network manages the storage and distribution of energy.

PASSIVE VENTILATION

More than 1,800 windows can be opened for natural ventilation.

NATURAL SOLUTIONS

4,730 m sq. of green areas to reduce heat islands.

LEED GOLD CERTIFICATION
HQE EXCELLENT
BREEAM OUTSTANDING
BBCA EXCELLENCE
E+C- LABEL
WELL GOLD CERTIFICATION
READYTOSERVICE 3*
WIREDSCORE PLATINUM
EFFINERGIE EXCELLENCE

Photo courtesy of Icade

Tour Elithis Danube

STRASBOURG, FRANCE RESIDENTIAL

GREEN TECHNOLOGIES

Solar photovoltaics on the roof and façade generate more than its electricity needs. Offsite renewable energy for heating is sourced from a biomass plant.

ENERGY EFFICIENT

Digital system for energy savings available in all apartments for residents to use, optimizing energy consumption while delivering improved levels of comfort and well-being.

NET-ZERO CARBON

The tower is certified net-zero operation carbon.

INNOVATIVE VENTILATION

Has a system of triple hybrid ventilation that allows the building to be adapted to each season.

ALLIANCE-HQE E+C-
WORLD'S FIRST "NO ENERGY INVOICE" BUILDING

Photo courtesy of Com'Air / Arte Charpentier Architectes

IntenCity

GRENOBLE, FRANCE OFFICE

ZERO-CO_2 BUILDING

No annual greenhouse gas emissions during operations.

INNOVATIVE DESIGN

Interior design maximizes operational function by reducing the amount of space needed to operate.

RENEWABLE ENERGY

Photovoltaic panels, wind turbines, and on-site energy storage to be energy self-sufficient.

ENERGY EFFICIENT

Uses 10 times less energy than standard building.

EFFICIENT TRANSPORT

Workers are provided with electric vehicles and encouraged to use sustainable transport methods both on and off campus.

LEED ZERO CARBON CERTIFICATION

Photo courtesy of Architecture Groupe-6

Saint-Joseph Media Library

ST. JOSEPH, REUNION ISLAND, FRANCE COMMUNITY

INNOVATIVE VENTILATION

Its orientation and design allow the building to have cross ventilation to reduce the inside temperature and humidity.

SUSTAINABLE MATERIALS

A great part of the building is built with sustainable local materials that reduce its carbon footprint and it is surrounded by vegetation.

THERMAL INNOVATION

The inside of the building has a 'wood skin' that traps heat and radiation and keeps the temperature stable.

Photo courtesy of Arquitectura Viva

ENERGY & HOT CLIMATE AWARD

BNP Paribas #Curve Building

SAINT-DENIS, FRANCE OFFICE

SUSTAINABLE MATERIALS

Reduced building carbon footprint as one of the biggest buildings with a wooden frame, which also allows quiet and fast assembly.

NATURAL SOLUTIONS

The building houses several green spaces and a green roof that reduce the heat island effect.

PASSIVE DESIGN

The façade of the building also allows natural light to come in, reducing the need for artificial lighting.

HQE CERTIFICATION
EFFINERGIE+ LABEL
E+/C- LABEL

Photo courtesy of Modulyss

Tour Boils-le-Prêtre

PARIS, FRANCE RESIDENTIAL

INNOVATIVE STRUCTURE

Apartment floors were increased by an external extra skin layer that both increased energy efficiency and extended the floor plan by 3 meters along the entire perimeter.

INNOVATIVE RENOVATION

The remodel of the original building was done with minimal extra costs without vacating the building.

ENERGY EFFICIENT

Renovation achieved 50% more energy-efficient apartments, with improved natural light and comfort.

GLOBAL AWARD FOR SUSTAINABLE ARCHITECTURE

Photo courtesy of Dezeen

Collège Samuel Paty

VALENTON, FRANCE COMMUNITY

RENEWABLE ENERGY

The roof faces south to improve the productivity of the solar photovoltaic system (in progress), which reduces the energy purchase needs.

EFFICIENT FAÇADE

Highly insulated with no thermal bridges, even in the triple-glazed windows with mixed wood-aluminium joints to reduce thermal transfer.

EFFICIENT INSULATION

Designed to avoid overheating with adiabatic system with recovered rainwater.

PASSIVE LIGHTING

The façade allows an abundant amount of light to come through. Skylight brings natural light in deep within the building as far as the corridors.

SUSTAINABLE MATERIALS

Consisting of a concrete base and three floors made of local wooden posts and beams and wooden exterior walls. With this thermal resistance, it was less expensive and more sustainable than traditional concrete construction.

PASSIVE BUILDING+

HQE EXCELLENT

PASSIVHAUS CERTIFICATION

First Passive Building certified college in France

Photo courtesy of ArchDaily

World's First Passivhaus in Darmstadt-Kranichstein, Germany (page 7

Photo courtesy of Passive House Kranichste

GERMANY

BUILDING NAME	LOCATION	BUILDING TYPE
City Hall Freiburg	Freiburg	Office
CampusRO	Rosenheim	Community
Eisbärhaus	Kirchheim	Residential
energy+Home1.0	Darmstadt	Residential
World's First Passive House	Darmstadt-Kranichstein	Residential
Langes Haus	Karpfsee	Residential
Elobau Logistics Centre	Baden-Württemberg	Office
Class Wing at Schubart Gymnasium	Aalen	Community
Quartier WIR	Berlin	Residential
Soft House	Hamburg	Residential

City Hall Freiburg

FREIBURG, GERMANY OFFICE

RENEWABLE ENERGY

High-performance solar energy panels on the roof and façade, combined with geothermal wells, thermal solar panels coupled with heat pumps.

EFFICIENT COMFORT

Thermal mass activation, heating/cooling sails, external solar screening, triple glazing and mechanical ventilation with heat recovery.

ENERGY POSITIVE

Net-surplus energy feeds excess electricity to the city grid.

ENERGY EFFICIENT

40% energy savings from efficient heating, hot water, cooling and ventilation.

DGNB CLIMATE POSITIVE

WORLD'S FIRST PUBLIC BUILDING TO NET-SURPLUS-ENERGY

Photo courtesy of Archello

CampusRO

ROSENHEIM, GERMANY COMMUNITY

SUSTAINABLE MATERIALS

The hybrid wood structure reduced CO2 by 50% compared to conventional construction.

RENEWABLE ENERGY

Solar photovoltaics generate green electricity on-site.

INTEGRATED DESIGN

Design allows for local plants and fauna in its green areas.

RECYCLABLE MATERIALS

Built with recycled old building materials to reduce its carbon footprint.

EFFICIENT INSULATION

The use of wood insulates the building preventing any significant heat loss.

DGNB CLIMATE POSITIVE

Photo courtesy of CampusRO

Eisbärhaus

KIRCHHEIM, GERMANY RESIDENTIAL

CLIMATE POSITIVE

All electricity is fulfilled by solar photovoltaics, and the annual CO_2 balance is negative.

EFFICIENT WATER USE

Rainwater is captured and stored in cisterns for use onsite.

EFFICIENT HEATING

The building is heated with geothermal energy and a heat pump.

EFFICIENT INSULATION

Walls are thick and insulated with efficient materials including cellulose.

SUSTAINABLE MATERIALS

Timber is used for the internal formwork and external façade .

Passive building

Photo courtesy of UBM Magazine

Energy+Home 1.0

DARMSTADT, GERMANY RESIDENTIAL

NET-ZERO BUILDING

Powered by renewable energy, the building generates more energy than it uses.

EFFICIENT INSULATION

A high thermal insulation shell and glazed window prevent heat loss.

EFFICIENT HEATING

An efficient air-to-water heat pump and central ventilation are used to minimize energy requirements.

RENEWABLE ENERGY

A 12.6 kWp solar photovoltaic system on the roof covers electricity demand from the home plus an electric car.

DGNB CLIMATE POSITIVE

Photo courtesy of Deutsche BauZeitschrift

World's First Passivhaus

DARMSTADT-KRANICHSTEIN, GERMANY RESIDENTIAL

PASSIVE DESIGN

The house's design, orientation, layout of the openings, building materials and green areas achieve thermal comfort and healthy air quality with minimum energy demand.

EFFICIENT INSULATION

The house combined existing components and new elements, like triple-glazed windows and airtightness, to achieve excellent insulation and prevent heat loss.

EFFICIENT HEATING

Improved ventilation coupled with heat recovery and a ground source heat exchanger preheats fresh air. Solar collectors provide hot water.

INNOVATIVE DESIGN

Its orientation and location maximize natural light to reduce the need for artificial lighting.

PASSIVHAUS PLUS CERTIFICATION
World's first Passivhaus, in operation for over 30 years

Photo courtesy of PassiveHouse+

Langes Haus

KARPFSEE, GERMANY RESIDENTIAL

SUSTAINABLE MATERIALS

Transformation of an old farmhouse using wood from surrounding areas to reduce carbon footprint.

ENERGY SUFFICIENT

In case of power outage the building has a unique system that can operate it as an 'energy island'.

RENEWABLE ENERGY

40kw solar photovoltaics and biomass from excess wood chips from 100-hectare forest produces 55kW of heat and 20kW of electricity in a wood gasification combined heat and power system.

CLIMATE POSITIVE

Operates entirely on renewables as is produces more energy than it uses.

DGNB CLIMATE POSITIVE

Photo courtesy of Petra Rainer

Elobau Logistics Center

BADEN-WÜRTTEMBERG, GERMANY OFFICE

SUSTAINABLE MATERIALS

Built with wood to minimize embodied carbon.

ENERGY EFFICIENT

Saves 90% of energy according to the German Energy Saving Ordinance.

PASSIVE DESIGN

Carefully positioned windows and skylight openings, together with night-time ventilation, removed the need for mechanical ventilation.

EFFICIENT LIGHTING

Glass panels on the saw-tooth roof are fitted with adjustable vertical blinds to manage natural light. The building is also fitted with dimmable LED lamps.

DGNB CLIMATE POSITIVE

Photo courtesy of Transsolar

Class Wing at Schubart-Gymnasium

AALEN, GERMANY COMMUNITY

ZERO-ENERGY BUILDING

A photovoltaic system on the roof generates enough renewable electricity to cover all consumption over the year.

EFFICIENT LIGHTING

As an active house the building maximizes naturally occurring environmental light

ENERGY EFFICIENT

Insulation was optimized through simulation balancing both cost and energy efficiency. Excess energy produced by the photovoltaic system is fed to the old main building which covers the low heating demand of the science block

EFFICIENT VENTILATION

Combines mechanically supported ventilation with natural ventilation to ensure excellent air quality.

DGNB CLIMATE POSITIVE

Photo courtesy of Liebel Architekten

Quartier WIR

BERLIN, GERMANY RESIDENTIAL

RENEWABLE MATERIALS

Built using mainly renewable materials, such as wood and cellulose insulation, to reduce carbon footprint.

EFFICIENT HEATING

It is heated by a district heating system reducing heating costs.

GREEN TECHNOLOGIES

The roof has a green area irrigated with rainwater that reduces the heat island effect.

EFFICIENT VENTILATION

Cooled with controlled ventilation and heat-recovery systems.

DGNB CLIMATE POSITIVE

Photo courtesy of PresseBox

Soft House

HAMBURG, GERMANY RESIDENTIAL

INNOVATIVE FAÇADE

Responsive solar-tracking architecture with thin-film photovoltaics that provide electricity as well as sunlight.

SUSTAINABLE MATERIALS

Built with sustainably sourced wood that reduces its carbon footprint.

INNOVATIVE VENTILATION

Three-story air convection 'atrium' modulates warm and cool air with a system of interior curtains and window vents.

EFFICIENT HEATING

Heat pumps efficiently keep occupied spaces comfortable.

FIABCI PRIX D'EXCELLENCE GERMANY
2014 A+ AWARDS

Passive building

Photo courtesy of DAAM

Infosys Crescent in Bengaluru, India (page

> Infosys Crescent campus is an example of Net Zero approach to design, and super-efficient building performance. Integrated design approach and innovative systems, resulting in an EPI less than 70 kWh/sqm per year, is replicable both at scale and speed to accelerate decarbonization globally

GURUPRAKASH SASTRY

Head – Climate Action, Infosys Ltd

Photo courtesy of Infos

INDIA

BUILDING NAME	LOCATION	BUILDING TYPE
CII Sohrabji Godrej Green Business Centre	Hyderabad	Office
Indira Paryavaran Bhawan	Delhi	Office
Capgemini EPIP Bangalore	Bengaluru	Office
ITC Green Centre	Gurugram	Office
Suzlon One Earth	Pune	Office
CRISIL House	Mumbai	Office
Kempegowda International Airport Terminal 2	Bengaluru	Airport
Alembic Museum	Vadodara	Community
Net Zero Energy Building at CEPT	Ahmedabad	Community
Infosys Crescent	Bengaluru	Office

CII Sohrabji Godrej Green Business Centre

HYDERABAD, INDIA OFFICE

INTEGRATED DESIGN
Built to blend into the local landscape. Designed to bring passive, active and renewable energy solutions together.

LOCAL MATERIALS
The materials used for the construction were sourced locally to reduce the carbon footprint.

PASSIVE DESIGN
Bioclimatic green roofs and architectural design that captures wind and reduces energy use for cooling and ventilation.

ENERGY EFFICIENT
Building is designed to reduce energy usage by 50% and able to achieve net-zero energy.

INNOVATIVE DESIGN
Designed to maximize the use of natural light. Increased renewable energy generation through bifacial solar PV.

GREEN TECHNOLOGIES
Solar photovoltaic panels and building envelope that reduce usage and heat gains while increasing daylight.

IGBC NET ZERO ENERGY PLATINUM

FIRST LEED PLATINUM RATED GREEN BUILDING IN THE COUNTRY

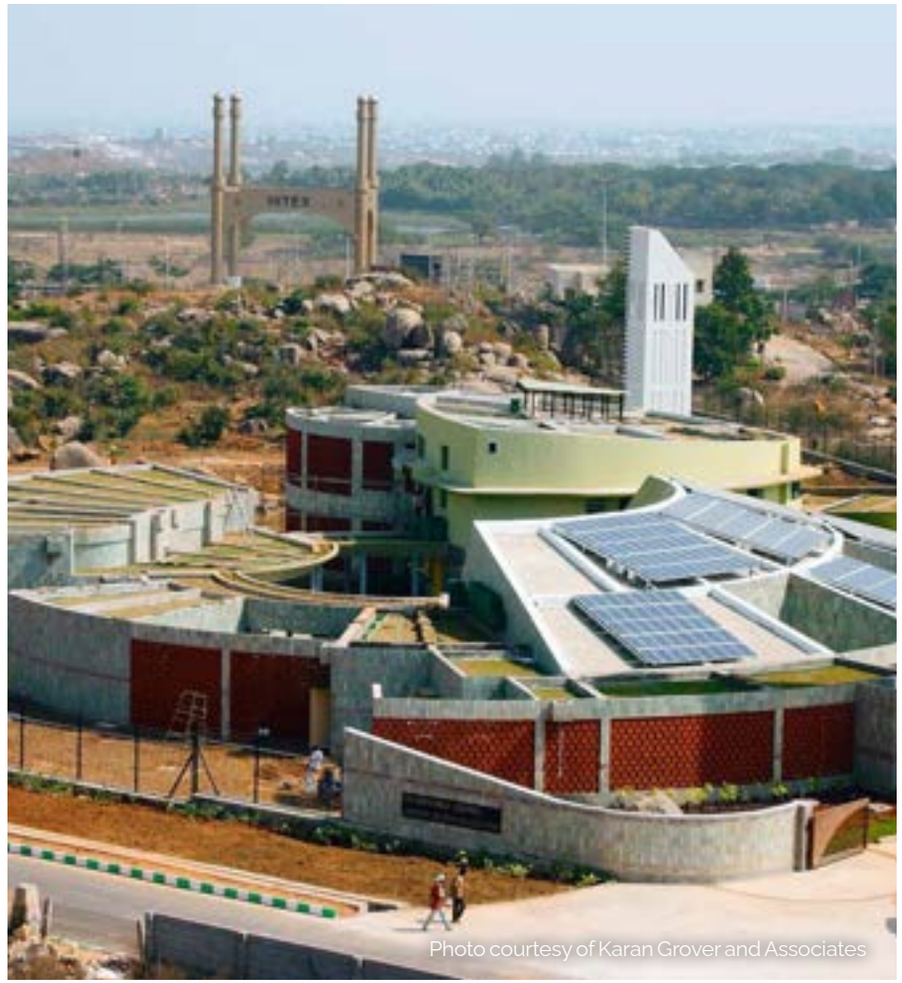


Photo courtesy of Karan Grover and Associates

Indira Paryavaran Bhawan

DELHI, INDIA OFFICE

ENERGY EFFICIENT

Efficient technologies to reduce building energy use by 70%, including a chilled beam system for cooling that saves 40% energy consumption.

RENEWABLE ENERGY

930 kW solar photovoltaic panels generate energy supplied to the grid.

SUSTAINABLE MATERIALS

Rapidly renewable bamboo used for door frames & shutters. Green materials such as fly ash bricks, regional material, high recycled content material, high reflectance terrace tiles and rock wool insulation of outer walls.

EFFICIENT WATER USE

Water consumption is low due to use of low flow water fixtures, recycling of treated wastewater, and the use of plants with low water demand in landscaping.

LEED PLATINUM CERTIFICATION
5 STAR RATING BY GRIHA

Photo courtesy of REHAU

Capgemini EPIP Bangalore

BENGALURU, INDIA OFFICE

ENERGY EFFICIENT

Super-efficient HVAC integrated with district cooling for air conditioning. LED lights with motion and occupancy-based control. It uses an integrated AI-driven Power Usage Effectiveness system for all its data centre operations.

DATA-DRIVEN

An "energy command centre" monitors, controls, and manages the performance of energy assets, and measures a variety of metrics across different campuses.

RENEWABLE ENERGY

A 1300 kWp solar PV plant is installed on-site, and balance is sourced from offsite solar and wind farms. Excess solar energy is exported to state utility grid. Periphery is lit through solar-powered lights.

WATER AND WASTE EFFICIENT

100% of wastewater is recycled and used within the campus. An organic waste composter (OWC) composts all food and landscape waste into manure.

NET ZERO ENERGY PLATINUM BY THE INDIA GBC
First net zero energy platinum corporate campus in India

Photo courtesy of BEE

ITC Green Centre

GURUGRAM, INDIA OFFICE

EFFICIENT WATER USE

Building has efficient water-use technologies that help it save 40% of potable-use water.

GREEN TECHNOLOGIES

The building has a water treatment system that saves water for toilets and irrigation.

SUSTAINABLE MATERIALS

Building construction was performed using sustainable materials to reduce its carbon footprint.

INNOVATIVE DESIGN

Thanks to the L-shape configuration, allows natural light to penetrate deep into the building and creates shading to avoid overheating.

LEED PLATINUM CERTIFICATION

Photo courtesy of World Building Directory

Suzlon One Earth

PUNE, INDIA OFFICE

INTEGRATED DESIGN

The inside of the building blends with its exterior and the surrounding landscape.

PASSIVE DESIGN

Its design allows efficient natural lighting and cross ventilation.

NEAR NET ZERO

92% of the energy consumed comes from sustainable sources.

RENEWABLE ENERGY

Photovoltaic panels and windmills are used to meet energy needs sustainably.

LEED PLATINUM CERTIFICATION

Photo courtesy of The Architectural Review

CRISIL House

MUMBAI, INDIA OFFICE

PASSIVE DESIGN

Green roof helps reduce the heat island effect and houses local flora.

EFFICIENT WATER USE

The building has plumbing fixtures that help reduce the use of water by 80%.

RECYCLABLE MATERIALS

Recycled locally sourced sustainable materials to reduce its carbon footprint.

LEED PLATINUM CERTIFICATION

Photo courtesy of Shiksha

Kempegowda International Airport Terminal 2

BENGALURU, INDIA AIRPORT

BIOCLIMATIC DESIGN

Biophilic design with 31% of total site area (3,27,460 sqm) as landscape area. Rainwater is harvested to fill pond.

SUSTAINABLE MATERIALS

Rapidly renewable material accounting for more than 90% of wood-based materials.

EFFICIENT WATER USE

37% reduction in potable water demand due to efficient water fixtures. Rainwater harvesting included, together with IOT based irrigation system.

RENEWABLE ENERGY

Biogas plant with capacity of 70,000 kgs per day.

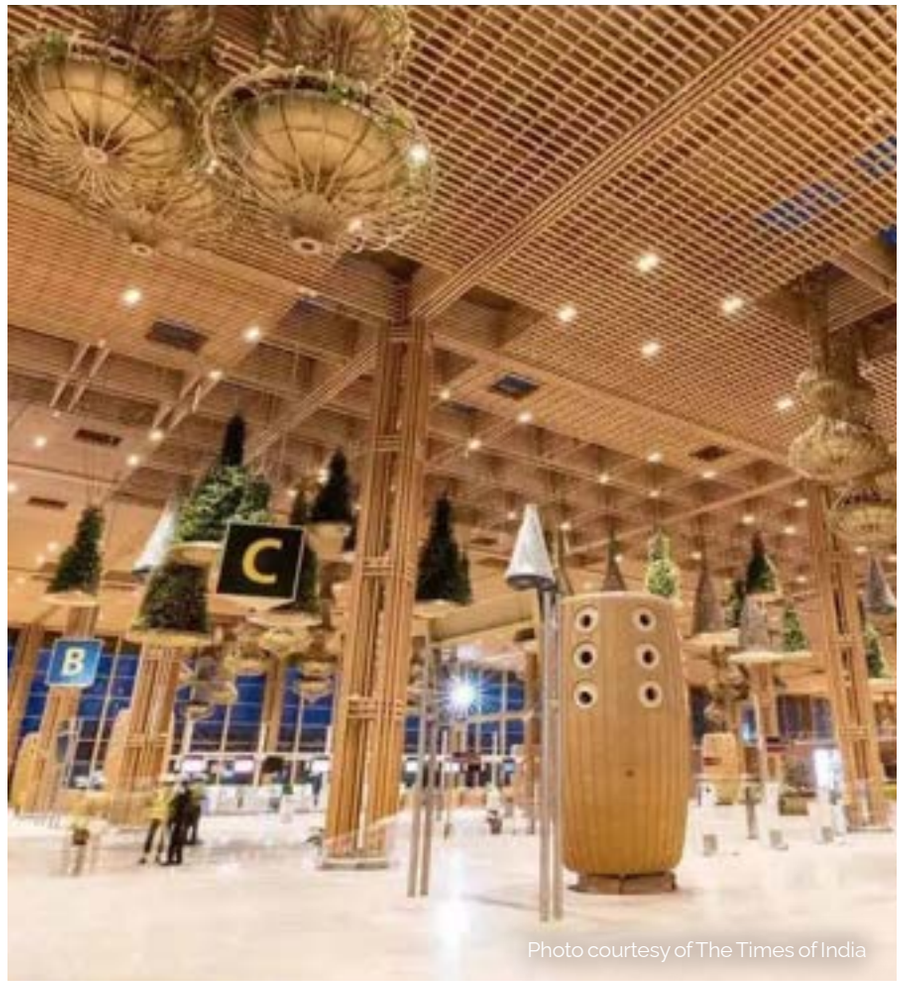


Photo courtesy of The Times of India

IGBC PLATINUM CERTIFICATION

First of its kind garden in terminal

Alembic Museum

VADODARA, INDIA COMMUNITY

INNOVATIVE DESIGN

The space is designed to accommodate and adapt to the expositions being displayed.

EFFICIENT INSULATION

Insulating materials used to maintain a constant temperature inside.

LOW-COST BUILDING

Built using the remains of the old structure to decrease the cost of construction.

ENERGY EFFICIENT

Design was optimized for natural ventilation and daylight to reduce operational energy use.

Highly adaptive low-cost re-use of building ruins

Photo courtesy of ArchDaily

Net-Zero Energy Building at CEPT

AHMEDABAD, INDIA COMMUNITY

ENERGY LIGHTING

All the lighting fixtures of the building are highly efficient LEDs. They can be dimmed and even change colour.

INNOVATIVE COOLING

The building uses a radiant cooling system where chilled water is pumped through it.

EFFICIENT VENTILATION

In coordination with the cooling system the building has a dedicated outdoor air system that provides fresh air for peak cooling periods.

RENEWABLE ENERGY

Rooftop 30 kWp solar photovoltaic panels, which allow the building to operate as net-zero energy.

NET-ZERO CERTIFIED

Photo courtesy of The Times of India

Infosys Crescent

BENGALURU, INDIA OFFICE

ENERGY EFFICIENCY

Building Energy Performance Index (EPI) of 70 kWh/sqm per annum, which is 50% better than the industry standards.

EFFICIENT WATER USE

100% rainwater harvesting and 100% of wastewater treated and reused.

INNOVATIVE CONSTRUCTION

Complete building with precast technology with 25,000 precast elements used thereby significantly reducing construction water use and eliminating on-site construction waste.

INNOVATIVE COOLING

Innovative radiant cooling system developed in-house and patented. 50% more efficient than conventional air-conditioning. Also helps to maintain superior indoor air quality.

NEAR NET ZERO

Rooftop 260 kWp solar photovoltaic panels. 80% of the energy needs are met by on-site and off-site renewable. Carbon offsets project implemented.

LEED PLATINUM CERTIFICATION

Photo courtesy of Anil Mandal

Capgemini EPIP in Bengaluru, India (page 80)

Photo courtesy of Capgemini India

INDONESIA

BUILDING NAME	LOCATION	BUILDING TYPE
The Arc	Bali	Community

The Arc

BALI, INDONESIA COMMUNITY

ZERO ENERGY BUILDING

The structure consists entirely of bamboo – with 19-meters arches, stabilized by tensile membranes – providing strength and shade.

SUSTAINABLE MATERIALS

Was built using only local and renewable materials to reduce its carbon footprint.

INNOVATIVE VENTILATION

Its unique shape allows it to be cooled by cross- ventilation, without the use of any cooling system.

INNOVATIVE INSULATION

Buildings of this kind are well insulated against water and radiation.

Photo courtesy of Tommaso Riva

2022 SUPREME AWARD FOR STRUCTURAL ENGINEERING EXCELLENCE

ITALY

BUILDING NAME	LOCATION	BUILDING TYPE
Bosco Verticale	Milan	Residential
Habitat Lab	Milan	Community
Passive House Pichler	Pfitsch	Residential

Bosco Verticale

MILAN, ITALY RESIDENTIAL

VERTICAL FOREST

Houses approximately 15,000 plants selected by expert agronomists

BIO DESIGN

The plants absorb CO_2, reduce radiation and prevent dust particles from entering the building.

RENEWABLE ENERGY

Has solar panels installed that supply renewable electricity.

EFFICIENT WATER USE

Has efficient water irrigation systems to water the vertical forest.

ENERGY EFFICIENT

The shading effect of the trees can reduce the amount of direct sunlight entering the apartments, thereby decreasing the need for artificial cooling and lighting.

NOISE INSULATION

The vegetation contributes to reducing noise pollution by acting as a buffer against street noise.

LEED GOLD CERTIFICATION

Photo courtesy of ArchDaily

Habitat Lab

MILAN, ITALY COMMUNITY

EFFICIENT INSULATION

Thanks to the state-of-the-art glazing, the building can maintain a stable temperature.

NET ZERO ENERGY

It uses renewable energy for its operations.

GREEN TECHNOLOGIES

Has solar photovoltaics and an innovative façade that helps reduce the amount of energy needed for lighting.

SUSTAINABLE MATERIALS

It consists of renovated 1950s cafeteria and a new extension, built using recycled materials to reduce its carbon footprint.

LEED PLATINUM CERTIFICATION
Highest rated LEED Platinum building in Italy

Photo courtesy of Ongreening

Passive House Pichler

PFITSCH, ITALY RESIDENTIAL

PASSIVE HEATING

The house is heated by passive solar gain-and-recovery ventilation.

EFFICIENT HEATING

Wood pellet boiler provides extra heat as needed through the ventilation system.

EFFICIENT INSULATION

Insulated with efficient materials to maintain a stable temperature inside.

EFFICIENT VENTILATION

Ventilation system allows air circulation without losing heat or cool air.

EFFICIENT INVESTMENT

The wood construction and the precise planning enabled an efficient and cost-saving realization within a short period of time.

EFFICIENT LIFESTYLE

Conceptual focus on the ever-changing life phases and the potential for future enhancements within the thermal insulation envelope.

PASSIVHAUS CERTIFICATION

Photo courtesy of Arch. Walter Colombi & Arch. MSc. Urb. Arthur Pichler

JAPAN

BUILDING NAME	LOCATION	BUILDING TYPE
ACROS Fukuoka Prefecture International Hall	Fukuoka	Office
Bunyukaku	Tokyo	Community

ACROS Fukuoka Prefectural International Hall

FUKUOKA, JAPAN OFFICE

INTEGRATED DESIGN

The roof houses a diverse number of plants that help reduce the heat island effect.

EFFICIENT COMFORT

Roof insulation reduces variability in temperature, decreasing costs for heating and cooling.

NATURAL COOLING

The vegetation on the roofs reduces heat transfer, keeping the building cooler in the summer.

EFFICIENT WATER USE

The building captures rainwater for the irrigation of the roof garden.

JAPAN INSTITUTE OF ARCHITECTS CERTIFICATE OF ENVIRONMENTAL ARCHITECTURE

Photo courtesy of Japan Experience

Bunyukaku

TOKYO, JAPAN COMMUNITY

SUSTAINABLE MATERIALS

Built with low-impact sustainable materials to reduce its overall carbon footprint.

EFFICIENT INSULATION

Well insulated against temperature changes and noise from the city.

EFFICIENT HEATING

Heat pump with a heat-recovery system reduces the amount of energy needed to provide heat.

PASSIVHAUS CERTIFICATION

Photo courtesy of Passive House Database

TAPHA Taller Passive House in Mexico City, Mexico (page 10

Photo courtesy of Marisa Egea and Alejandro Herre

MEXICO

BUILDING NAME	LOCATION	BUILDING TYPE
Torre Reforma	Mexico City	Office
TAPHA Taller Passive House	Mexico City	Residential

Torre Reforma

MEXICO CITY, MEXICO OFFICE

EFFICIENT WATER USE

Water conservation systems include rainwater collection, water reuse and advanced wastewater treatment.

PARKING EFFICIENCY

Fully-automated parking saves space and decreases car emissions.

INNOVATIVE DESIGN

The building maximizes natural light to reduce the need for artificial lighting.

INNOVATIVE VENTILATION

Naturally ventilated atria, and automated window controls allow cool air in.

RENEWABLE ENERGY

Clean energy from on-site solar panels installed on the building's façade, contributing to its power needs.

ENERGY EFFICIENT

High-performance glass façades, efficient lighting systems, energy-saving HVAC and high-efficiency cooling plant that uses ice storage.

LEED PLATINUM CERTIFICATION

Photo courtesy of Schindler Mexico

TAPHA Taller Passive House

MEXICO CITY, MEXICO RESIDENTIAL

EFFICIENT INSULATION

Built with efficient materials that allow the space to conserve inside temperature.

SUSTAINABLE MATERIALS

Uses plywood in its structure to reduce its carbon footprint.

EFFICIENT INSULATION

Doors and windows are triple-glazed in order to prevent sudden gains or losses in temperature throughout the day.

PASSIVE DESIGN

Thanks to the building's orientation the sun efficiently heats and lights the structure in a way that reduces energy requirements for heating and lighting.

EFFICIENT VENTILATION

Cross natural ventilation provides fresh air, with no need for heat recovery ventilation.

PASSIVHAUS CERTIFICATION
Mexico's first passive house

Photo courtesy of Alejandro Herrera Estela

Torre Reforma in Mexico City, Mexico (page 100)

Photo courtesy of torrereforma.com

SAUDI ARABIA

BUILDING NAME	LOCATION	BUILDING TYPE
Angawi House	Jeddah	Residential

Angawi House

JEDDAH, SAUDI ARABIA RESIDENTIAL

TRADITIONAL DESIGN

Thanks to the use of traditional architectural techniques – such as lattice formations – the house is naturally ventilated and allows natural light to come in.

PASSIVE DESIGN

The house has multiple green spaces that help reduce the inside temperature and reduce the heat island effect.

LOCAL MATERIALS

Combining a mixture of modern and traditional materials helped reduce its carbon footprint.

NATURAL VENTILATION

Built around the prevailing winds, the entire place is naturally ventilated for at least 6 months a year, reducing the need for air-conditioning.

Photo courtesy of Construction Week Online

Passive and natural design

SOUTH AFRICA

BUILDING NAME	LOCATION	BUILDING TYPE
Africa Centre for Health & Population Studies	Somkhele	Office
The Sandbag House	Freedom Park	Residential
Department of Environmental Affairs Head Office	Pretoria	Office
Vredenburg Hospital	Vredenburg	Healthcare

Africa Centre for Health and Population Studies

SOMKHELE, SOUTH AFRICA OFFICE

INNOVATIVE DESIGN

The building's location and position allow it to be naturally lit and to have a natural cross-ventilation system.

INNOVATIVE COOLING

The building has a 15-meter water tower that acts as a thermal stack to help it cool down.

SUSTAINABLE MATERIALS

Built with sustainable materials locally sourced to reduce its overall carbon footprint.

Photo courtesy of Arqhys

SAIA AWARD FOR EXCELLENCE, NOVEMBER 2003

The Sandbag House

FREEDOM PARK, SOUTH AFRICA RESIDENTIAL

LOW-COST MATERIALS

The construction used low-cost materials and sandbags that reduce the cost of construction.

INNOVATIVE INSULATION

The sandbags fitted into the walls provide good insulation, keeping the house cool in the warmer months.

ENERGY EFFICIENT

The thermal mass of the soil-filled sandbags regulates indoor temperatures, reducing the need for artificial heating and cooling.

EFFICIENT CONSTRUCTION

Construction also required no electricity; it involved only hand labour.

RECYCLABLE MATERIALS

In the event of demolition, the earth-filled sandbags can be reused or returned to the environment without generating significant waste.

CERTIFIED BY SOUTH AFRICAN BUREAU OF STANDARDS AND THE NATIONAL HOME BUILDERS REGISTRATION COUNCIL

Photo courtesy of Design Space Africa

Department of Environmental Affairs Head Office

PRETORIA, SOUTH AFRICA OFFICE

RENEWABLE ENERGY

Solar photovoltaic panels generate electricity on-site.

ENERGY EFFICIENT

Energy monitoring system that can control the use and allocation of energy used.

INNOVATIVE COOLING

An evaporative cooling plant for the building reduces its energy intensity for cooling.

NATURAL SOLUTIONS

Green areas located inside and around the building including roof gardens decrease heat islands.

6 STAR GREEN STAR CERTIFICATION

Photo courtesy of Mott MacDonald

Vredenburg Hospital

VREDENBURG, SOUTH AFRICA HEALTHCARE

INNOVATIVE DESIGN

The building interior can be reorganized to adapt for further renovations. 80% daylight autonomy is achieved with roof lights designed to separate light and heat.

INCLUSIVE DESIGN

The building blends itself with its surrounding environment and green areas.

INNOVATIVE INSULATION

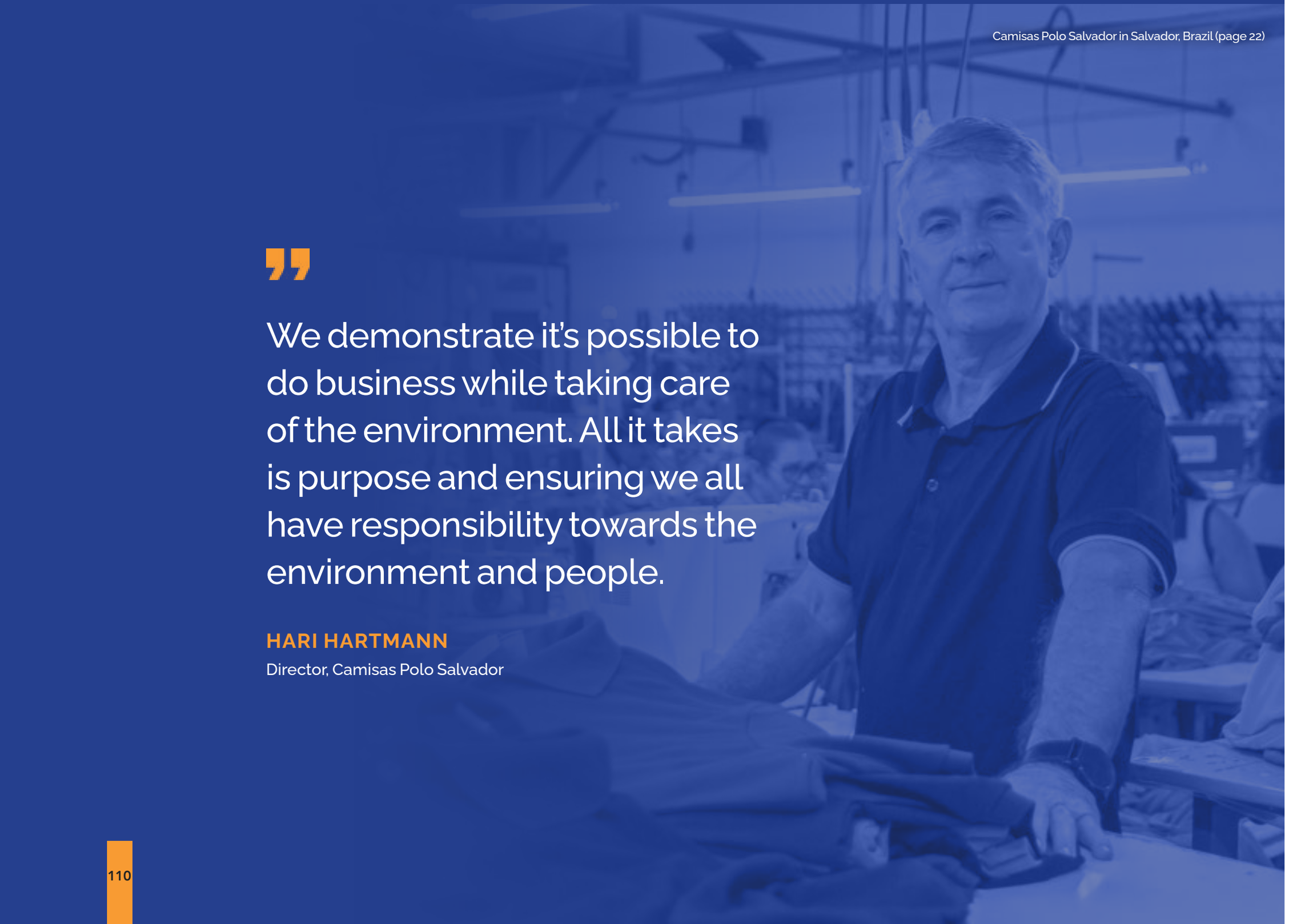
The skylights and windows allow the building to be naturally lit while maintaining a stable temperature inside.

ADAPTIVE SPACE

Regarding inner spacing, the hospital inner planning was reworked be more functional and create a more dignified space for patients.

AFRISAM-SOUTH AFRICAN INSTITUTE OF ARCHITECTS (SAIA) SUSTAINABLE DESIGN AWARD

Photo courtesy of The Architectural Review



Camisas Polo Salvador in Salvador, Brazil (page 22)

We demonstrate it's possible to do business while taking care of the environment. All it takes is purpose and ensuring we all have responsibility towards the environment and people.

HARI HARTMANN

Director, Camisas Polo Salvador

SOUTH KOREA

BUILDING NAME	LOCATION	BUILDING TYPE
Sangnok-Gu District Office	Seoul	Office

Sangnok-Gu District Office

SEOUL, SOUTH KOREA OFFICE

ENERGY EFFICIENT

Efficient systems, LED fixtures and modern technologies.

RENEWABLE ENERGY

Solar photovoltaic modules installed on exterior walls generate on-site electricity.

EFFICIENT FAÇADE

Insulated windows reduce noise and heat transfer to increase comfort.

EFFICIENT ROOF

Efficiently insulated and sealed roof to prevent water leaks water or variability in temperature.

GYEONGGI-DO ARCHITECTURE CULTURE AWARD

Photo courtesy of Hanwha

TÜRKIYE

BUILDING NAME	LOCATION	BUILDING TYPE
Allianz Tower (Ronesans Tower)	Istanbul	Office
GAP Energy Efficiency Incubation Center	Gaziantep	Community

Allianz Tower (Ronesans Tower)

ISTANBUL, TURKEY OFFICE

INNOVATIVE INSULATION

The tower is covered with sufficient glazing to reduce its energy intensity for cooling by 80%.

NATURAL SOLUTIONS

Multiple green areas that reduce the heat island effect and maintain a cool temperature inside.

EFFICIENT WATER USE

Rainwater is collected and reused for irrigation and non-potable uses, reducing the need for purchased water.

EFFICIENT ORIENTATION

Orientation to maximize the floor plate size and natural lighting.

ENERGY EFFICIENT

Advanced energy-efficient systems, including LED lighting, efficient HVAC systems and smart building management systems.

LEED PLATINUM CERTIFICATION

Photo courtesy of Mega Construcciones

GAP Energy Efficiency and Consultant Incubation Center

GAZIANTEP, TURKEY COMMUNITY

EFFICIENCY FAÇADE

Masonry with high thermal mass combined with . Insulation, triple-glazed windows and air sealing.

SUSTAINABLE MATERIALS

Existing masonry structure retained, and sustainably sourced materials reduce overall carbon footprint.

RENEWABLE ENERGY

Solar thermal panels on the roof to provide hot water.

EFFICIENT SYSTEMS

Mechanical ventilation with heat recovery and air-source heat pump with radiant heating for efficiency and comfort.

PASSIVHAUS CERTIFICATION
First passive house renovation in Turkey

Photo courtesy of Construction21

Lark Rise in Buckinghamshire, United Kingdom (page 119)

Photo courtesy of bere:architects

UNITED KINGDOM

BUILDING NAME	LOCATION	BUILDING TYPE
62 Kimpton Rd	Wheathampstead	Residential
Lark Rise	Buckinghamshire	Residential
The Crystal	London	Office
One Angel Square	Manchester	Retail
Kintyre	Flamstead	Residential
One Embankment Place	London	Office

62 Kimpton Road

WHEATHAMPSTEAD, UNITED KINGDOM RESIDENTIAL

NET-ZERO ENERGY

35 solar photovoltaic panels produce more energy than the home consumes.

INNOVATIVE VENTILATION

It has a system of mechanical ventilation that helps reduce its energy needs.

SUSTAINABLE MATERIALS

Construction materials with recycled content and materials salvaged from demolition.

EFFICIENT SYSTEMS

Uses a ground-source heat pump and mechanical ventilation with heat recovery.

EFFICIENT INSULATION

Structurally insulated panels, double-glazed windows, and triple-glazed doors.

NET ZERO ENERGY AND/OR CARBON CERTIFICATION
BUILDING FUTURES AWARD 2016

Photo courtesy of ZEHo Projects Ltd

Lark Rise

BUCKINGHAMSHIRE, UNITED KINGDOM RESIDENTIAL

PASSIVE DESIGN

Thermal mass, combined with efficient insulation and windows support stable interior temperatures.

ALL ELECTRIC

Operating solely on electricity from onsite solar energy with battery storage to optimize.

ENERGY EFFICIENT

Efficient heat pump for hot water combined with passive design and efficiency features combine to reduce energy use by 88%.

RENEWABLE ENERGY

38 photovoltaic panel system via a feed-in tariff for grid connectivity and additional income to the owner.

INTEGRATED DESIGN

Partially built underground to blend with surrounding area.

PASSIVHAUS PLUS CERTIFICATION
PASSIVHAUS AWARD 2021

Photo courtesy of ABC

The Crystal

LONDON, UNITED KINGDOM OFFICE

ALL ELECTRIC

Operating solely on fossil fuel fee electricity with energy provided by solar photovoltaic panels.

INNOVATIVE DESIGN

Natural light maximized to reduce the need for artificial lighting.

INTEGRATED LANDSCAPE

Surrounding landscaping designed with sustainable practices, including native plants that require less water and maintenance.

WATER EFFICIENCY

Rainwater harvesting, black water recycling systems for toilet and landscape watering.

ENERGY SYSTEMS

Smart controls, sensors and management systems to support comfort and low energy use.

SUSTAINABLE MATERIALS

During construction, efforts were made to use materials with low environmental impact, including recycled and locally sourced materials.

LEED PLATINUM CERTIFICATION

Photo courtesy of ArchDaily

One Angel Square

MANCHESTER, UNITED KINGDOM OFFICE

INNOVATIVE DESIGN

Its atrium and double-layered façade allow it to be naturally lit and efficiently cooled.

ENERGY EFFICIENT

Has LED lighting and high-efficiency passenger lifts.

HEAT RECOVERY

Computer system heat-recovery supports the heating of the building.

EFFICIENT WATER USE

Rainwater and greywater recycling systems for restrooms and irrigation.

TRIGENERATION

Building plan generates electricity, heating and cooling on-site.

MANAGEMENT SYSTEMS

Building management system monitors and controls energy usage, optimizing for efficiency and occupant comfort.

BREAM OUTSTANDING RATING

Photo courtesy of OnGreening

Kintyre

FLAMSTEAD, UNITED KINGDOM RESIDENTIAL

EFFICIENT SYSTEMS

Air-source heat pump and heat recovery ventilation system that reduces its energy requirements.

EFFICIENT INSULATION

High-performance walls and windows.

EFFICIENT LIGHTING

LED lights with smart controls to reduce use.

SUSTAINABLE MATERIALS

Built with sustainable local materials to reduce its carbon footprint.

RENEWABLE ENERGY

Constructed with wiring and location for future solar photo-voltaic system.

PASSIVHAUS CERTIFICATION

Photo courtesy of Architecture Today

One Embankment Place

LONDON, UNITED KINGDOM OFFICE

RENEWABLE ENERGY

Trigeneration energy plant uses biofuel from locally refined and recycled vegetable oil to provide heat, cooling and electricity.

NATURAL LIGHTING

Multiple atria allow natural light and reduce the need for artificial lighting.

NATURAL SOLUTIONS

Green walls and landscaped garden planting.

RESPONSIBLY BUILT

95% of construction materials were responsibly sourced materials and 96% of the waste was recycled.

VERTICAL MOBILITY

Designed to encourage use of stairs within the atria.

ENVIRONMENTAL PERFORMANCE CERTIFICATE A
BREEAM EXCELLENCE RATING

Photo courtesy of My London

Skapaskolan in Huddinge, Sweden (page 49)

Photo courtesy of Mattias Hamrén

UNITED STATES

BUILDING NAME	LOCATION	BUILDING TYPE
Bullitt Center	Seattle, Washington	Office
Environmental Science Center at Bishop O'Dowd High School	Oakland, California	Community
Phipps Center for Sustainable Landscapes	Pittsburgh, Pennsylvania	Community
Green Idea House	Hermosa Beach, California	Residential
Robert Redford Conservancy at Pitzer College	Claremont, California	Community
Alpine Branch Library	Alpine, California	Community
Lincoln Net Positive Farmhouse	Lincoln, Massachusetts	Residential
Jacobs Hall at University of California Berkeley	Berkeley, California	Community
Faculty House at Taft School	Watertown, Connecticut	Residential
117 Easy Street	Mountain View, California	Retail

Bullitt Center

SEATTLE, UNITED STATES OFFICE

RENEWABLE ENERGY

100% energy produced on-site from 575 solar photovoltaic panels that produce 230MWh per year.

EFFICIENT FAÇADE

Triple-glazed windows, operable windows combined with external automated shading.

WATER EFFICIENT

Greywater system collects and treats water from sinks and showers for reuse in toilets and a new wetland to recharge the aquifer.

EFFICIENT SYSTEMS

Ground-source heat pump and in-floor radiant heating and cooling delivers highly efficient comfort year-round.

VERTICAL MOBILITY

Designed to encourage use of stairs and when elevator is used it regenerates energy.

DURABLE DESIGN

Built to last and avoid energy and water bills for the next 250 years.

ILFI ZERO ENERGY CERTIFICATION
LIVING BUILDING CHALLENGE

Photo courtesy of ArchDaily

Bishop O'Dowd High School Environmental Science Center

OAKLAND, CALIFORNIA, UNITED STATES COMMUNITY

SUSTAINABLE MATERIALS

Construction used locally sourced renewable building materials.

RENEWABLE ENERGY

11.5 kW rooftop solar photovoltaic panels provide 100% of the building's energy needs.

NET-ZERO ENERGY

Designed to have more onsite energy production than energy use.

ONSITE WATER USE

4,000-gallon rainwater collection, filtration and ultraviolet disinfection reduces the water purchased for toilets.

ENERGY EFFICIENT

Electric heat pump, radiant-heated floor, high-performance insulation and low-emissivity windows.

ILFI ZERO ENERGY CERTIFICATION
LEED PLATINUM CERTIFICATION

Photo courtesy of Siegel & Strain Architects

Center for Sustainable Landscapes

PITTSBURGH, PENNSYLVANIA, UNITED STATES COMMUNITY

INTEGRATED DESIGN

The building blends with its surrounding landscape and houses more than 150 species of native plants.

EFFICIENT WATER USE

No potable water is used for irrigation, water collected from roof and garden runoff is used instead.

NET ZERO WATER

Annually, 500,000 gallons of rooftop water are used for irrigation.

NET-ZERO ENERGY

Efficient walls, windows and ventilation system controlled by a building automation system for optimization ensure that the renewable energy produced onsite is more than the energy used.

LEED PLATINUM CERTIFICATION

SUSTAINABLE SITES 4-STAR RATING

FIRST WELL BUILDING PLATINUM CERTIFICATION

LIVING BUILDING CHALLENGE

FITWEL 3-STAR RATING

FIRST BREEAM OUTSTANDING IN-USE CERTIFICATION IN THE US

FIRST SITES PLATINUM PROJECT

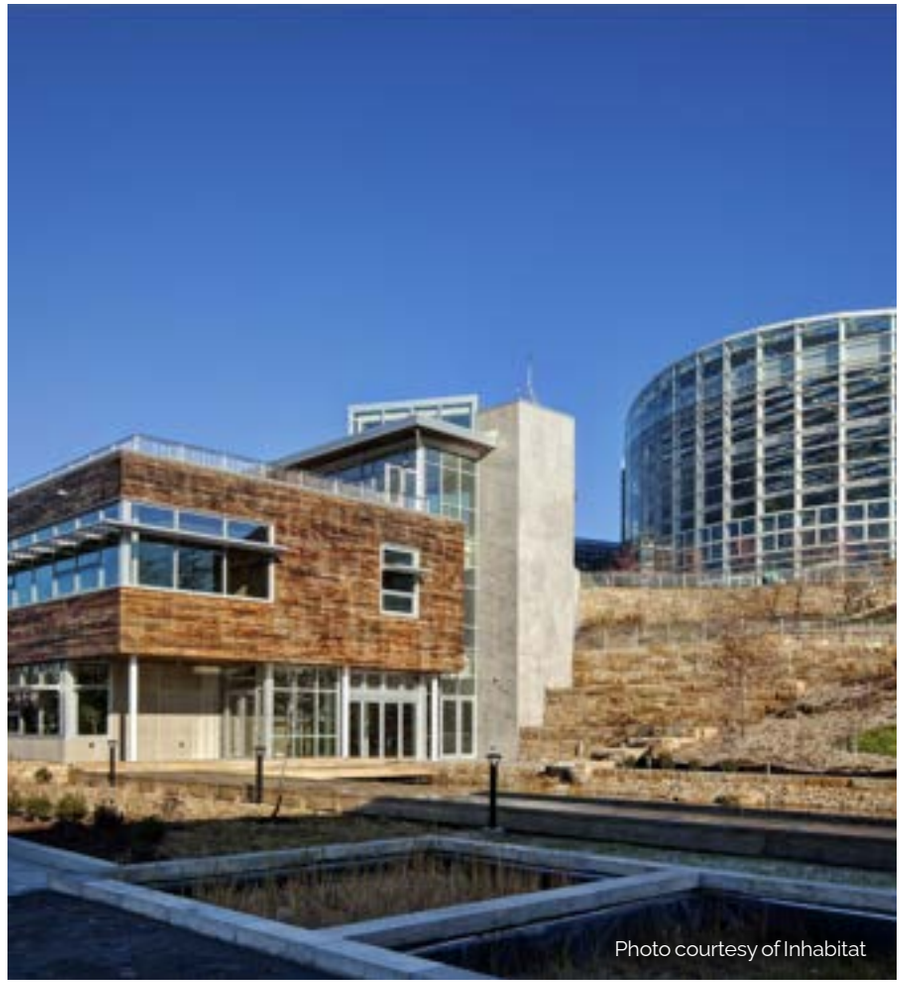


Photo courtesy of Inhabitat

Green Idea House

HERMOSA BEACH, CALIFORNIA, UNITED STATES RESIDENTIAL

PASSIVE CONDITIONING

Overhang, heat absorbing thermal mass materials and thermal chimney effect through skylights enable passive cooling and balanced day and night temperatures.

EFFICIENT SYSTEMS

Shower drain heat recovery, heat pump water heaters and water ambient preheat tank.

SUSTAINABLE STRUCTURE

Advanced framing with lumber certified by the Forest Stewardship Council.

RECYCLED MATERIALS

Project recycled 97.5% of the demolition waste and incorporated salvaged materials in construction.

GREEN TECHNOLOGIES

26 photovoltaic solar panels installed with the capacity to produce 6.5 kW of electricity.

ILFI ZERO ENERGY

Photo courtesy of International Living Future Institute

Pitzer College Robert Redford Conservancy

CLAREMONT, CALIFORNIA, UNITED STATES COMMUNITY

REGENERATIVE DESIGN

Renovated respectfully and ecological aspects of the site preserved.

NET-ZERO ENERGY

Designed to have more onsite energy production than energy use.

RECYCLED MATERIALS

Re-use of 91% of the original 1931 building and less construction waste reduced waste to landfill by 95%.

Photo courtesy of Introba

ILFI ZERO ENERGY CERTIFICATION
LEED PLATINUM CERTIFICATION

Alpine Branch Library

ALPINE, CALIFORNIA, UNITED STATES COMMUNITY

PASSIVE DESIGN

Building orientation and windows allow natural lighting to enter and solar heat gain to be blocked.

RENEWABLE ENERGY

72 kW rooftop solar photovoltaic panels installed to produce over 180 MWh per year of electricity.

NET-ZERO ENERGY

Designed to have more onsite energy production than energy use.

EFFICIENT LIGHTING

LED lighting controlled by sensors that dim or turn the lights off when there is ample daylight or no occupants.

EFFICIENT SYSTEMS

Variable refrigerant flow system with heat recovery ventilation provides cooling or heating as needed in each zone of the building.

ILFI ZERO ENERGY

Photo courtesy of San Diego Green Building Council

Lincoln Net-Positive Farmhouse

LINCOLN, MASSACHUSETTS, UNITED STATES RESIDENTIAL

NET-POSITIVE ENERGY

Consumes 70% less energy than a regular home and produces 48% more energy annually.

RENEWABLE ENERGY

Rooftop 13.1 kW solar photo-voltaics provides more energy than the building consumes.

EFFICIENT INSULATION

Walls and roofs are free of thermal bridges by using dense-packed cellulose and triple-glazed windows.

EFFICIENT SYSTEMS

Energy recovery ventilator and air-source heat pump warm and cool the house with a constant supply of fresh, clean air.

ILFI ZERO ENERGY
LIVING FUTURE INSTITUTE REVEAL
LEED PLATINUM CERTIFICATION

Photo courtesy of Boston Society for Architecture

Jacobs Institute for Design Innovation

BERKELEY, CALIFORNIA, UNITED STATES COMMUNITY

PASSIVE DESIGN

Reduced energy needs with operable windows, extensive daylighting and reduced solar heat gain.

EFFICIENT INSULATION

Walls and roofs are free of thermal bridges by using dense-packed insulation within the wood framing.

EFFICIENT SYSTEMS

Hot and chilled water for space conditioning is provided by surplus water from Soda Hall.

RENEWABLE ENERGY

Rooftop solar photovoltaic panels provide 60% of energy needed.

WATER EFFICIENCY

Roof water runoff is absorbed by filtering rain gardens; drought-tolerant landscaping and irrigation system reduces water needs by 50 percent.

LEED PLATINUM CERTIFICATION

Photo courtesy of ArchDaily

Taft Faculty House

WATERTOWN, CONNECTICUT, UNITED STATES RESIDENTIAL

EFFICIENT SYSTEMS

Efficient air-source heat pump for heating and cooling and heat pump water heater for domestic hot water.

EFFICIENT INSULATION

Air-tight envelope, 24-inch attic insulation, double-insulated walls and triple-glazed low emissivity windows.

RENEWABLE ENERGY

Rooftop 13.1 kW solar photo-voltaics.

EFFICIENT APPLIANCES

ENERGY STAR-rated fans, re-frigerator, dishwasher, washing machine and dryer.

LEED ZERO AND PLATINUM CERTIFICATION

ZERO-ENERGY-LIVING BUILDING CHALLENGE CERTIFIED

PHIUS+

ENERGY READY HOME

ENERGY STAR

DOE BUILDING AMERICA PARTNER

EPA INDOOR AIR PLUS

Photo courtesy of Trillium Architects

117 Easy Street

MOUNTAIN VIEW, CALIFORNIA, UNITED STATES RETAIL

ENERGY EFFICIENT

LED lighting with occupancy sensors combined with sky lights and electrochromic self-tinting glass windows for abundant natural day light.

SUSTAINABLE ENERGY

Rooftop solar PV and solar thermal panels combined with purchase of 50% renewable and 50% hydroelectricity.

RECYCLED MATERIALS

92.5% of demolition material was repurposed.

NET-ZERO ENERGY

Designed to have higher onsite renewable energy production than building energy use.

ILFI ZERO ENERGY CERTIFICATION

Photo courtesy of SHARP Development Company, Inc.

Powerhouse Kjørbo in Oslo, Norway (page 139)

Photo courtesy of Ida Kristin Schlotterbeck

HONOURABLE MENTIONS IN G20 AND BEYOND

BUILDING NAME	LOCATION	BUILDING TYPE
NUS School of Design and Environment 4	Singapore	Community
Powerhouse Kjørbo	Oslo, Norway	Office
Eastgate Centre	Harare, Zimbabwe	Retail
The Hive	Singapore	Office
Sky Terrace	Singapore	Residential
International Renewable Energy Agency Headquarters	Masdar City, UAE	Office
Whanau	Auckland, New Zealand	Residential
Globicon Terminals	Mumbai, India	Office
Goesan-Gun Seminar Facility	Goesan-Gun, South Korea	Hospitality

NUS School of Design and Environment 4

SINGAPORE COMMUNITY

NET-ZERO BUILDING

It is Singapore's first newly built net-zero building.

EFFICIENT COOLING

Hybrid cooling system that efficiently cools down the inner spaces with occupancy-sensing thermal controls.

GREEN TECHNOLOGIES

Installed with more than 1,200 photovoltaic solar panels that produce more energy than it requires.

INNOVATIVE VENTILATION

The building design allows it to be cooled passively.

ZERO-ENERGY CERTIFICATION

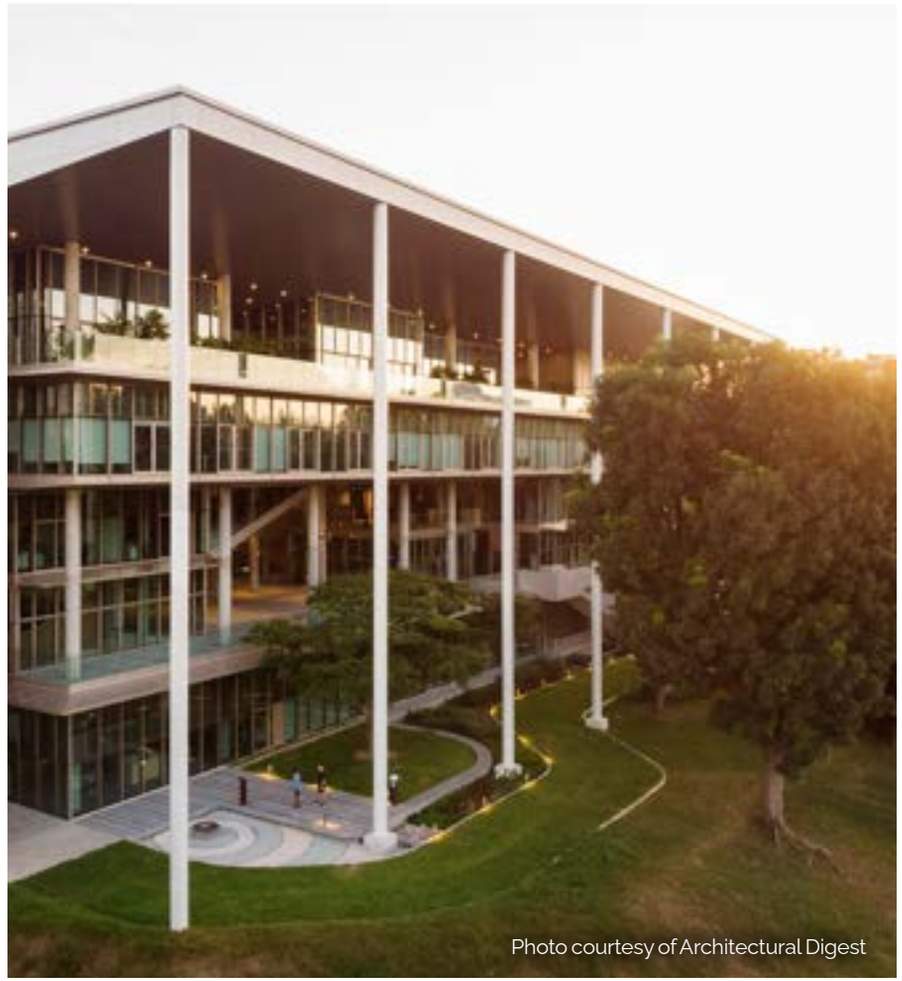


Photo courtesy of Architectural Digest

Powerhouse Kjørbo

OSLO, NORWAY OFFICE

EFFICIENT RENOVATION

The building was updated with innovative ventilation, insulation and lighting technologies reducing energy needs by 86%.

EFFICIENT HEATING AND COOLING

Heat pump with energy wells provide efficient heating and cooling.

SUSTAINABLE MATERIALS

Burnt wooden panels give a striking and eco-friendly signature to the exterior and is an important part of the climate shell

RENEWABLE ENERGY

Energy supply from one of Norway's largest solar energy plants.

ENERGY POSITIVE

Surplus energy produced by the buildings plant is supplied to other buildings in the area as well as to a nearby hydrogen station.

INNOVATIVE VENTILATION

The staircase has been designed to be the centerpiece in the building and acts as central ventilation duct.

BREEAM NOR "OUTSTANDING AS BUILT", AND "EXCELLENT" FOR CONSTRUCTION STAGE 2

NORWAY'S FIRST ENERGY-POSITIVE OFFICE BUILDING

Photo courtesy of Powerhouse

Eastgate Centre

HARARE, ZIMBABWE RETAIL

PASSIVE COOLING

No conventional air-conditioning yet stays regulated using self-cooling mounds and Zimbabwean masonry.

ENERGY EFFICIENT

It uses less than 10% of the energy of a conventional building its size.

ECONOMICALLY FRIENDLY

These savings also trickle down to the tenants whose rents are 20% lower.

CERTIFICATE OF MERIT BY THE INTERNATIONAL COUNCIL OF SHOPPING CENTRES

Photo courtesy of ARUP

The Hive

SINGAPORE OFFICE

PASSIVE DESIGN

Designed to reduce energy use with natural lighting and passive cooling ventilation.

INNOVATIVE VENTILATION

Hybrid passive ventilation and mechanical cooling that saves more than 30% energy to achieve comfort.

EFFICIENT LIGHTING

Equipped with efficient light fixtures with motion sensors to reduce its energy use.

EFFICIENT COOLING

Equipped with metal coils with cold water to further cool down the building.

NATURAL SOLUTIONS

Internal vertical greenery and rooftop terraces reduce solar glare and heat gain.

BCA GREEN MARK PLATINUM CERTIFICATE

Photo courtesy of McNeel

Sky Terrace

SINGAPORE RESIDENTIAL

RENEWABLE ENERGY

Roof-top photovoltaic panels to generate electricity.

EFFICIENT FACADE

High-performance double-glazed windows to reduce the heat gain.

EFFICIENT WATER USE

Rainwater collection and drip irrigation system both reduce consumption of water.

EFFICIENT TECHNOLOGIES

Energy and water efficient appliances. Motion sensors installed to reduce common area energy consumption.

BCA GREEN MARK PLATINUM CERTIFICATE

Photo courtesy of Stacked Homes

International Renewable Energy Agency Headquarters

MASDAR CITY, UAE OFFICE

RENEWABLE ENERGY

Roof-top solar covers 10% of building energy demand, including solar water heaters suppling 75% of hot water demand.

PASSIVE DESIGN

Building demands 42% less energy than global efficiency standards.

EFFICIENT COOLING

Cooling system & energy recovery ventilation saves 75% of energy to cool incoming fresh air.

EFFICIENT FAÇADE

External screen maximizes natural light while blocking 90% of solar radiation.

EFFICIENT PARKING

Shaded parking spaces include 26 EV charging stations.

WATER EFFICIENT

The complex uses 50% less water than typical buildings in Abu Dhabi.

4-PEARL ESTIDAMA CONSTRUCTION RATING
First building in UAE to achieve 4-pearl Estidama

Photo courtesy of Woods Bagot

Whanau

AUCKLAND, NEW ZEALAND RESIDENTIAL

PASSIVE DESIGN

Design of overhangs and window orientation allows this house to prevent overheating.

EFFICIENT INSULATION

Highly insulated roof and double-stud walls in combination with double-glazed windows.

EFFICIENT HEATING

Air-tight home envelope in combination with heat recovery ventilation and an air-source heat pump.

GREEN TECHNOLOGIES

Rainwater collection and solar photovoltaics.

PASSIVHAUS CERTIFICATION

New Zealand's first certified passive house

Photo courtesy of eHaus

Globicon Terminals

MUMBAI, INDIA OFFICE

EFFICIENT LIGHTING

The building reduced its lighting energy usage to one fourth of its original use.

WATER EFFICIENCY

The building has water treatment systems and rainwater harvest to reduce water usage in irrigation.

SUSTAINABLE MATERIALS

Built with eco-friendly materials to reduce carbon footprint and pollution.

RENEWABLE ENERGY

Use of solar photovoltaics to reduce energy usage.

LEED PLATINUM CERTIFICATION
INDIAN GBC NET ZERO ENERGY

Photo courtesy of Globicon Terminals

Goesan-Gun Seminar Facility

GOESAN-GUN, SOUTH KOREA HOSPITALITY

INNOVATIVE DESIGN

Orientation and position allows natural light throughout the day decreasing the need of artificial lighting.

EFFICIENT FAÇADE

Wood and cellulose insulation combined with very tight envelope reduce heat transfer.

EFFICIENT SYSTEMS

Mechanical ventilation with 86% heat recovery combined with heat pump to supply underfloor heating systems.

SUSTAINABLE MATERIALS

The whole structure is built with sustainably sourced materials that reduce its overall carbon footprint.

RENEWABLE ENERGY

153 sq m of solar thermal and geothermal heat collected by efficient heat pump.

PASSIVHAUS CERTIFICATION

Photo courtesy of EGA Group

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NZEB at CEPT University is been designed as Net Zero Energy and is been operated as a net positive energy building. This living lab houses R&D facilities for Building Energy Efficiency.

RAJAN RAWAL, PhD

Professor and Senior Advisor at CEPT University

100 ICONIC SUSTAINABLE BUILDINGS

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