

Green Buildings for Healthier People

Optimizing Climate, Health and Business Co-Benefits in Asia Pacific Real Estate

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The Urban Land Institute is a global, member-driven organization comprising more than 45,000 real estate and urban development professionals dedicated to advancing the Institute's mission of shaping the future of the built environment for transformative impact in communities worldwide. ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics. Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 80 countries.

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Urban Land Institute
2001 L Street, NW, Suite 200
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Contents

Introduction	5
<hr/>	
Project profiles: Strategies for reducing embodied carbon while enhancing health	8
T3 Collingwood, Melbourne	9
Kwu Tung North Multi-welfare Services Complex, Hong Kong	11
Tonkin Street redevelopment, Hong Kong	13
Otemachi Building, Tokyo	15
<hr/>	
Project profiles: Strategies for reducing operational carbon while enhancing health	17
One Museum Place, Shanghai	18
The Quayside, Hong Kong	20
NEO office portfolio, Manila	22
<hr/>	
Conclusion	24
<hr/>	
Acknowledgements	26
<hr/>	

About This Report

ULI's 2022 report *Greening Buildings for Healthier People* identifies building-scale opportunities to cost-effectively and simultaneously accelerate action on health and climate change while maximizing their business co-benefits. These insights hold particular relevance in the Asia Pacific, where some of the most valuable and densely populated real estate markets are located. These areas are often highly vulnerable to health risks such as air pollution and chronic stress, as well as climate change impacts. The strategies and benefits outlined in this report could thus serve as potent tools for building resilience, enhancing community well-being, and promoting sustainable growth in these critical urban landscapes.

Why This Matters

Investing in the climate and health benefits of a building is crucial for real estate assets to stay competitive and resilient, for several reasons:

- **Competitive Advantage:** As access to nature and eco-friendly features become increasingly desirable, properties that offer such amenities can stand out in a crowded market, attracting and retaining tenants more effectively.
- **Health and Productivity:** Features like biophilic design and outdoor green spaces can improve tenant health and productivity. This is especially relevant in office settings where healthier workspaces can lead to lower healthcare costs and higher retention rates.
- **Resilience:** Climate-adaptive features increase a building's resilience to environmental risks, such as extreme heat or flooding, thereby reducing potential costs associated with energy demand and damage repair.
- **Risk Mitigation:** Green and healthy buildings mitigate risks associated with future environmental and health regulations, rising certification and disclosure expectations, and uncertainties in energy and construction costs.
- **Community Impact:** Publicly accessible green spaces can foster social cohesion and reduce the urban heat island effect, extending the benefits of the property beyond its customers and fostering positive brand associations with the property.

This report compiles a sample of project profiles across APAC markets to demonstrate various opportunities to achieve health, climate and business co-benefits in an integrated approach.

Introduction

The COVID-19 pandemic threw a sharp focus on matters of health and wellness globally, and especially in the built environment. Most of us spend 90 percent of our time in buildings and have had an abrupt awakening to where we spend our waking hours and how that affects our mental and physical health. Our buildings need to play an active role in promoting health and wellbeing.

At the same time, we continue to hurtle towards 2050, the deadline for achieving carbon neutrality and limiting the global temperature warming to 1.5°C in this century. The built environment is responsible for about 40 percent of greenhouse gas emissions, so there can be no net zero without net zero buildings. In the urbanizing Asia Pacific (APAC) region, the majority of buildings which will exist in 2050 are already built, so adaptation of existing assets is as important as high-specification new buildings.

Nonetheless, to justify real estate investments, a business case is a must. Occupiers want comfort and views while also demanding energy cost-efficiency and a carbon footprint that contributes to their corporate net zero goals. These priorities do not have to be trade-offs.

This research report provides a framework to align the business case, health benefits, and climate benefits of investing in green, healthy buildings. It builds on ULI's [Greening Buildings for Healthier People](#) report through a series of project profiles of APAC real estate projects which demonstrate how health, sustainability, and good business can successfully intersect.

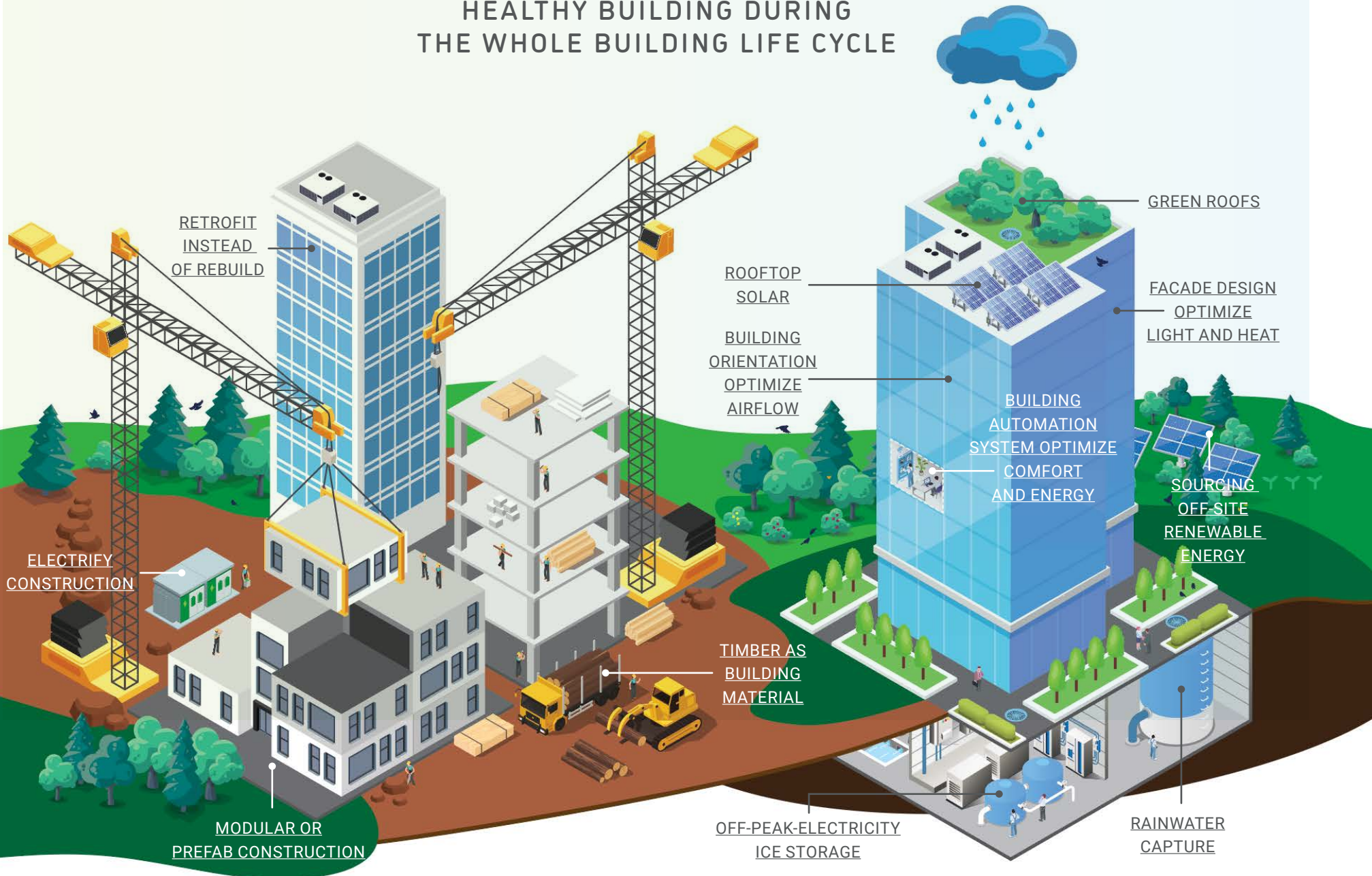
Green, healthy buildings have a profound impact on everyone from the construction workers who build them, to the tenants who occupy them, and to the surrounding community that services them. Some features, such as green infrastructure, are highly visible and promote wellbeing. Others work behind the scenes and remove unwanted sensory experiences, such as construction noise and waste, or improve air quality.

These green, healthy building practices also contribute to the longer-term resilience of the community. For example, modular integrated construction (MiC) technology enables affordable housing to be built cheaper and faster, making it more accessible and thus reducing the detrimental effects of homelessness and housing insecurity on health.

Opportunities to incorporate sustainability and wellness initiatives exist throughout the life cycle of a building. From construction site technology to retrofitting a historic building towards a 100-year lifespan, this report gathers project profiles from the APAC region to showcase the many creative ways to make our buildings better for people, planet, and prosperity.

While the examples presented highlight specific solutions, these projects include a range of elements designed to improve sustainability and health. Asset owners report that an integrated design process involving key stakeholders is crucial to grounding the process in sustainability and producing the best outcomes.


SELECTED STRATEGIES FOR GREEN AND HEALTHY BUILDING DURING THE WHOLE BUILDING LIFE CYCLE



ADDITIONAL OPPORTUNITIES AND STRATEGIES FOR CLIMATE AND HEALTH FROM [GREENING BUILDINGS FOR HEALTHIER PEOPLE](#)

Summary of Report Opportunities and Strategies for Climate and Health

Category	Opportunity	Selected strategies for climate mitigation and health	Selected strategies for climate resilience and health
Tactical design choices	Site selection	<ul style="list-style-type: none"> • Transit-oriented development • Infill development 	<ul style="list-style-type: none"> • Evaluating the suitability of the site for development
	New building and site design	<ul style="list-style-type: none"> • Active design (e.g., prominent staircases) • Daylighting 	<ul style="list-style-type: none"> • Green stormwater infrastructure • Resilience hubs
	Electrification and decarbonization	<ul style="list-style-type: none"> • All-electric systems • Upgrading appliances to electric versions 	<ul style="list-style-type: none"> • On-site solar (also has significant benefits for climate mitigation)
	Energy efficiency	<ul style="list-style-type: none"> • Passive design 	<ul style="list-style-type: none"> • Cool and green roofs • Weatherization for passive survivability
	Building materials	<ul style="list-style-type: none"> • Using healthy and less carbon-intensive materials, and/or using fewer materials where possible 	<ul style="list-style-type: none"> • Using materials that can better withstand natural disasters, are nonflammable, and are mold-resistant
Strategic real estate decisions	Acquisition and disposition	<ul style="list-style-type: none"> • Integrating sustainability and health factors into due diligence and property condition assessments 	<ul style="list-style-type: none"> • Capture and communicate to buyers the value of resilience and its health co-benefits
	Leasing	<ul style="list-style-type: none"> • Green leases that include health considerations 	<ul style="list-style-type: none"> • Socially responsible practices
	Property management, operations, and tenant improvements	<ul style="list-style-type: none"> • Tenant engagement and communication • Optimized operations setpoints for tenant comfort 	<ul style="list-style-type: none"> • Promoting social cohesion through programming



Project profiles: Strategies for reducing embodied carbon while enhancing health

PROJECT TYPE:
New build

LOCATION:
Melbourne,
Australia

DEVELOPER:
Hines

BUILDING TYPE:
Office

T3 Collingwood

“Wood is a renewable resource and creates a really beautiful atmosphere. We’re very proud of the sustainability objectives we’ve achieved. We’re very proud of the aesthetic; we’re very proud of the contribution we’ve made to the area.”

—Jo Lees, Construction Manager, Hines



A rendering of Hines’s T3 Collingwood, a wooden office building in Melbourne. (Hines)

Health benefits:

- Presence of wood in the indoor environment reduces stress and anxiety
- Timber provides better acoustic absorption and creates a quieter environment
- More fire-resistant than traditional building materials

Climate benefits:

- Thirty-four percent reduction in embodied carbon compared with conventional construction
- Occupiers often choose to use exposed wood, which results in less fit-out material used and further reduces embodied carbon
- Timber has better thermal performance than steel and concrete, requiring less heating and cooling energy

Business case:

- Quicker to construct; reduce indoor energy and material use
- Tenants are more attracted to timber floors than steel and concrete floors
- Improve productivity and concentration for occupants

Doing good with wood

Hines's T3 construction methodology replaces concrete and steel with prefabricated solid wood, enabling faster, lower-carbon construction and developments that offer an aesthetically pleasing and healthy environment.

T3 stands for timber, transit, and technology; the buildings aim to blend the inspiring, natural feel of timber spaces with cutting-edge technology and good transit links to attract leading occupiers.

The T3 Collingwood office building in Melbourne, Australia is the first T3 project in the Asia Pacific region. It features six storeys of conventional concrete construction and nine of engineered timber. The development uses 3,500 cubic metres (4,578 cubic yards) of wood from Australian sustainable forests, a quantity which is regrown every 11 minutes.

Mass timber is lighter than steel and concrete, and less carbon is emitted in its production, meaning a reduction in embodied carbon in the construction process. For this building Hines estimates a 34 percent reduction.

A number of studies have pointed to the health benefits of wooden buildings. A 2005 Japanese study showed workers in wooden-panelled buildings had lower blood pressure, while other studies have pointed to reduced stress. An Australian study surveyed 1,000 workers and found a correlation between the presence of wood and employees' overall satisfaction at work, lower absenteeism, higher levels of concentration, and improved productivity.

The aesthetic appeal of wooden interiors means occupiers tend to use less materials in fit-out, says Hines, which leads to a reduction in volatile organic compounds and further lowers embodied carbon. Timber also has better acoustic and thermal performance than traditional building materials, which both create a more comfortable environment and reduce energy demand for heating and cooling.

Despite concerns from some building regulation bodies, engineered timber does not create additional fire hazards and actually behaves more predictably in a fire than steel and concrete.

PROJECT TYPE:
New build

LOCATION:
Hong Kong SAR

MAIN CONTRACTOR:
SOCAM
Development

BUILDING TYPE:
Senior housing

Kwu Tung North Multi-welfare Services Complex

“[Electric construction] also helps reduce the impacts we have on the surrounding community and improve the productivity of our operations. This is the future of construction; we must make it sustainable and data-driven.”

—Adrian Lo, Head of Corporate Development, SOCAM Development



A rendering of the Kwu Tung North Multi-welfare Services Complex in Hong Kong. (SOCAM Development)

Health benefits:

- Reducing on-site noise and air pollution for construction workers and neighbours
- Reducing safety hazards caused by diesel handling, such as spills and fires

Climate benefits:

- A 61 percent reduction in carbon emissions to power machinery, compared with diesel generators

Business case:

- Improved productivity via data analytics provided by the battery system
- Greater equipment reliability compared to diesel generators, reducing operational downtime

Amping up construction, dialling down noise and emissions

Emissions from the built environment start long before an asset is completed. Construction is responsible for 11 percent of global carbon emissions, and a significant proportion of this comes from the diesel generators typically used in urban construction. These generators also produce considerable noise and exhaust fumes.



Ampd Energy's "Enertainer" battery system in action on a Hong Kong construction site. (Ampd Energy)

In Hong Kong, SOCAM Development used mobile battery systems to replace diesel generators in the construction of the Kwu Tung North Multi-welfare Services Complex. The complex is constructed over eight floors and provides 1,750 housing units for elderly and disabled individuals.

SOCAM Development used the "Enertainer" battery systems developed by Ampd Energy, a Hong Kong-based company. Each Enertainer is a mobile unit with thousands of lithium-ion cells, which can be charged from the grid and which can meet the power needs of construction machinery. SOCAM used four units, replacing four 400 kilovolt-ampere (kVA) diesel generators to power four high-capacity tower cranes.

Electrification of construction machinery has the immediate impact of reducing on-site emissions. SOCAM estimates a 61 percent reduction in carbon emissions compared with the replaced diesel generators. Removing diesel generators also reduces noise and air pollution, making the construction site a healthier place to work. Risks from spillage or other fuel hazards are also removed. On sites where grid power comes from renewables, the embodied carbon of the construction process will be further reduced.

The project also used modular integrated construction to fabricate the accommodation units off site, which reduces the environmental impact of construction and accelerates construction time.

PROJECT TYPE:
New build

LOCATION:
Hong Kong SAR

DEVELOPER:
Chinachem Group/
Urban Renewal
Authority

BUILDING TYPE:
Residential

Tonkin Street Redevelopment



Rendering of the Tonkin Street redevelopment. (Chinachem Group)

Health benefits:

- Reduce construction noise by 75 percent
- Prefabrication reduces the need for outdoor construction work under harsh weather
- MiC technology enables public housing supply to be quickly built, alleviating housing shortage and poor living conditions

Climate benefits:

- Reduce construction waste by 68 percent

Business case:

- Increase the construction speed of the project by 30 percent
- Reduce the number of on-site workers by 70 percent
- Conduct quality control in a factory setting, reducing on-site quality issues

“The application of MiC will cut down on on-site construction processes and thus the waste generated during construction. We expect a 68 percent cut on construction waste, a 75 percent reduction in noise pollution, and a reduction in carbon emissions, thereby reducing the nuisance caused to the neighbouring communities.”

—Donald Choi, Executive Director and Chief Executive Officer,
Chinachem Group

Modular construction boosts speed, reduces emissions

A joint project of Chinachem Group and Hong Kong’s Urban Renewal Authority, the Tonkin Street redevelopment project is the first private residential project in the city to adopt MiC technology. The residential development in North Kowloon, Hong Kong, will provide 191 apartments across 22 residential floors.

Adopting MiC can help speed up construction and reduce cost, waste, and construction-related noise and air pollution. In this case, the developer estimates that construction speed can be increased by 30 percent and the amount of construction waste reduced by 68 percent. Noise from construction, a frequent bugbear for Hong Kong residents, will be cut by 75 percent.

Further benefits to the developer include a 70 percent reduction in the number of on-site workers required. This is particularly important in Hong Kong, which is battling a shortage of labour in the construction industry. The speed of the development’s delivery was also accelerated by a fully digital design phase, which the developer estimates saved a full year of design time.

Accelerating the delivery of housing is particularly important in Hong Kong as the city has an ongoing housing shortage and an average of only 16 square metres (172 sq ft) of living space for each citizen. Faster delivery of new housing and providing families with a more reasonable amount of living space provide a multitude of long-term physical and mental health benefits.

The project also features a facade with biophilic design and increased natural light, as well as natural ventilation. The modular units feature removable non-structural walls, which will allow residents to customize their space.

PROJECT TYPE:
Retrofit

LOCATION:
Tokyo, Japan

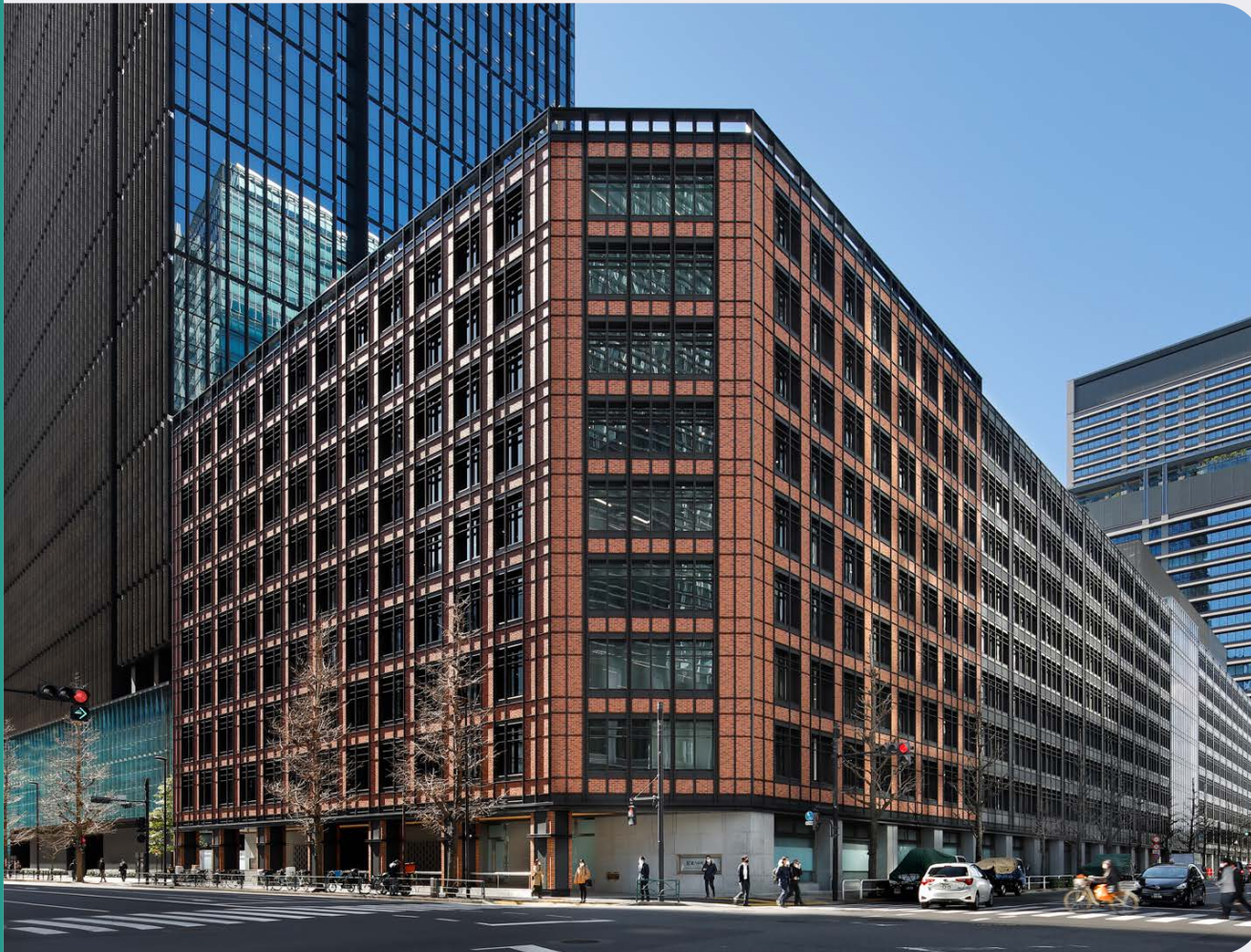
DEVELOPER:
Mitsubishi Estate

BUILDING TYPE:
Office

Otemachi Building

“Mitsubishi Estate will continue to embrace the challenge of buildings that last for 100 years with the aim of creating value in the form of hubs for the generation of new businesses.”

—Mitsubishi Estate



Revamped exterior of the 60-year-old Otemachi Building in Tokyo. (Mitsubishi Estate)

Health benefits:

- The rooftop garden and open interior design promote wellness and encourage movement and social interaction

Climate benefits:

- Reduces embodied carbon by extending building life span by 40 years as compared with demolition and rebuilding
- Green roof reduces heat absorption and the heat island effect
- High-specification glass with improved insulation and LED lights lower energy use

Business case:

- Reduced cost of refurbishment versus redevelopment
- “Renovation in use” resulted in continued occupation during the process

Driving a 60-year-old building towards its centenary

The Otemachi Building, located in the heart of Tokyo, was the first rental office building developed by Mitsubishi Estate to be fully air conditioned. Built in 1958, it housed both office and retail tenants, offering 7,000-square-metre (75,350 sq ft) floor plates, amongst the largest in the East, with a total floor area of 111,272 square metres (1,198,000 sq ft).



Caption. (credit)

Today, the Otemachi Building has been dwarfed by nearby glass skyscrapers and would have been an obvious candidate for demolition and redevelopment into something much larger. However, Mitsubishi Estate believed this grand dame still had plenty of life and opted to refurbish rather than demolish.

Mitsubishi Estate believed the short-spanned columns and long corridors met demand for small-scale, start-up offices and so focused its attention on the exterior, the interior of the shared areas, the underground retail floor, and the rooftop use to extend the life of the building. This also meant tenants could remain in situ during the renovation process. The retrofitted building saved approximately 44 percent of energy with the use of double glazing, improved insulation, and embedded sunshade fins. The post-renovation operation carbon intensity matches that of a brand-new class A office building.

The renovated building has been reconceived as a tech innovation hub. In addition to more than 100 office and retail tenants, over 100 sub-tenants including start-ups occupy the business incubator facilities, creating a diverse and dynamic community. Interior shared spaces were redesigned to create lounges and terraces, facilitating a creative environment for the exchange of ideas. Adding a 4,000-square-metre (43,055 sq ft) rooftop garden – the largest rooftop space for an office building in Tokyo – gives workers access to green open space, which has health benefits. The 200-metre-long (656 ft) garden features a track for walking or running, numerous seating areas, and an urban farm.

Project profiles: Strategies for reducing operational carbon while enhancing health



PROJECT TYPE:
New build

LOCATION:
Shanghai, China

DEVELOPER:
Hines

BUILDING TYPE:
Office

One Museum Place



Hines's One Museum Place in Shanghai has a host of sustainability and wellness features. (Hines)

Health benefits:

- Floor-to-ceiling windows maximize natural light
- Advanced air quality monitoring and filtering improves tenant health
- Green open spaces enhance neighbourhood and occupant wellbeing

Climate benefits:

- Green roof reduces solar heat gain
- Building automation system gives real-time monitoring to save energy
- Rainwater storage provides water for irrigating green spaces
- Rooftop solar with 140 kW generation capacity provides enough power for three floors of use

Business case:

- Ice storage system uses lower-cost night-time electricity for cooling
- Building attracts higher rents compared with peers
- Office occupancy rate of 96 percent with a high tenant satisfaction rate

“One Museum Place prioritized sustainability right at the beginning with the design, and it remains key in our operations – through its energy-efficient systems, indoor air quality technologies, water recapture systems, green roof, and more.”

–Tina He, Managing Director, Hines, and General Manager of One Museum Place, Shanghai, China

Focusing on continual improvement

One Museum Place, located in the heart of downtown Shanghai, is a class A office tower 250 metres (820 ft) tall, with an attached six-storey lifestyle retail pavilion. With a total gross floor area of about 183,000 square metres (1,970,000 sq ft), it is directly linked to the Shanghai metro.

Hines acquired the project part-way through its development and so has been constantly working to improve the sustainability and wellness aspects. Employee health is an important focus, with substantial natural light from floor-to-ceiling windows and a market-leading air filtration system. The façade design reduces heat absorption as well as reflection, making it more comfortable for its neighbours as well as its occupiers. The building also features garden space which is open to the public.

The building features a number of technologies that reduce energy consumption and cost, including an ice-storage air-conditioning system, which uses electricity to make ice during the night for cooling during the day, when electricity is more expensive. Rooftop solar can generate enough power to cover three floors of office use, while insulated, low-E glass reduces solar gain in summer. The building automation system provides automatic control and real-time monitoring of mechanical equipment, pumps, fans, lighting, and other motors to optimize energy saving.

In 2022, Hines managed to reduce emissions from building operations by 19.4 percent compared with the previous year and to reduce water consumption by 7.8 percent. Green leases with environmental and wellness clauses are used.

Hines reports that One Museum Place achieves higher rents than comparable buildings and achieves 96 percent office occupancy rate, with a 9.38 out of 10 tenant satisfaction rate.

PROJECT TYPE:
New build

LOCATION:
Hong Kong SAR

DEVELOPER:
Century Land
Investment Ltd (Link
Asset Management
Limited and Nan Fung
Development Ltd)

BUILDING TYPE:
Office

The Quayside



Health benefits:

- Building oriented to maximize views and airflow
- Podium garden provides open space and a walking track

Climate benefits:

- Shading fins reduce solar heat gain
- Electric vehicle charging points encourage green transportation
- Air induction units cut electricity use for cooling by 65 percent

Business case:

- Wellness and sustainability measures account for only 3 percent of construction costs
- Sustainability features are expected to enhance “stickiness” among tenants despite a weaker leasing market

Link REIT's The Quayside features fins to reduce solar heat gain. *(Link Asset Management Ltd)*

“When we looked at the overall design, what we wanted to do was also to go a little bit beyond the requirements of LEED and really [think] about what would make the building different from the rest of the competition, because this is a very competitive market.”

—Emmanuel Farcis, Director of Asset Management, Hong Kong, Link REIT

Exterior design boosts energy efficiency and wellness

The Quayside is a 21-storey office building in Hong Kong’s Kowloon East district, developed by Link REIT. It has more than 80,000 square metres (860,000 sq ft) of office space on around 4,600-square-metre (50,000-sq-ft) floor plates.

The project has more than 40 sustainability and wellness features, many integrated into the building’s design. For example, the building is at a 45-degree angle to the road to maximize views of Hong Kong harbour and to increase airflow. It also features innovative shading fins which reduce solar heat gain during the day and slanted ceilings to maximize daylight.

The building’s cooling system uses rooftop solar panels to dehumidify incoming air, which can reduce the electricity requirement for the HVAC system. To encourage green travelling, its 415 parking spaces are all equipped with electric vehicle chargers, making the property one of the most electric-car-friendly buildings in Hong Kong.

The third-floor podium garden covers around 2,200 square metres (24,000 sq ft) and includes a walking track which generates electricity. The amount is not substantial, but it has encouraged tenants to use the facility and to think about electricity usage.

Link is entering the first tenant lease renegotiations and believes the building’s sustainability and wellness features will make it more competitive and encourage tenants to renew their leases.

The sustainability features account for only about 3 percent of the total construction costs, which Link believes will contribute to “future-proofing” the building.

PROJECT TYPE:

Retrofit

LOCATION:

Manila,
Philippines

DEVELOPER:

NEO

BUILDING TYPE:

Office

NEO Portfolio

“We seek to fortify the case that green buildings are good for people as well as the environment.”

—Raymond Rufino, Chief Executive Officer, NEO



The green amphitheatre at Five/NEO in Manila. (NEO)

Health benefits:

- Programming to boost community activity
- Green walls, purifiers, and bipolar ionizers improve air quality

Climate benefits:

- Portfolio uses 100 percent renewable energy via power purchase agreement
- Energy consumption down 18 percent and water consumption down 64 percent since 2017

Business case:

- Cost of off-site renewable energy is 40 to 50 percent lower than fossil fuel prices
- Wellness and sustainability features drive company positioning

A zero-carbon portfolio which maximizes wellness

The NEO office portfolio in Manila, Philippines, comprises seven office properties constructed between 2002 and 2015. Major retrofit projects began in 2012 for water efficiency and in 2015 for energy efficiency.



Office workers do yoga at the NEO office development in Manila. (NEO)

Securing renewable power from an off-site geothermal energy facility since 2013 means the portfolio has been able to achieve net zero in operations but continues to target improvements in energy use, which was down 18 percent between 2017 and 2022 (after normalizing for COVID occupancy). The efficiencies have come through building management and passive design features, such as aluminium shades. The electricity cost from the off-site renewable source is 40 to 50 percent lower than fossil fuel prices, contributing to significant operational savings.

NEO initially focused mainly on energy efficiency in the portfolio but has more recently pivoted towards wellness and social cohesion. Each building has air purifiers and bipolar ionizers to improve air quality, complemented by the development featuring biophilic design elements such as green walls and parks. The development's triangular park of native flora is open to the public. The portfolio was also the first in Southeast Asia to achieve the WELL Health-Safety rating.

A community programme, #theNEOway, has been designed to create a community around the portfolio. The programme, with an average of 40 events each year, focuses strongly on mental health and wellness, as well as educating tenants and staff about sustainability.

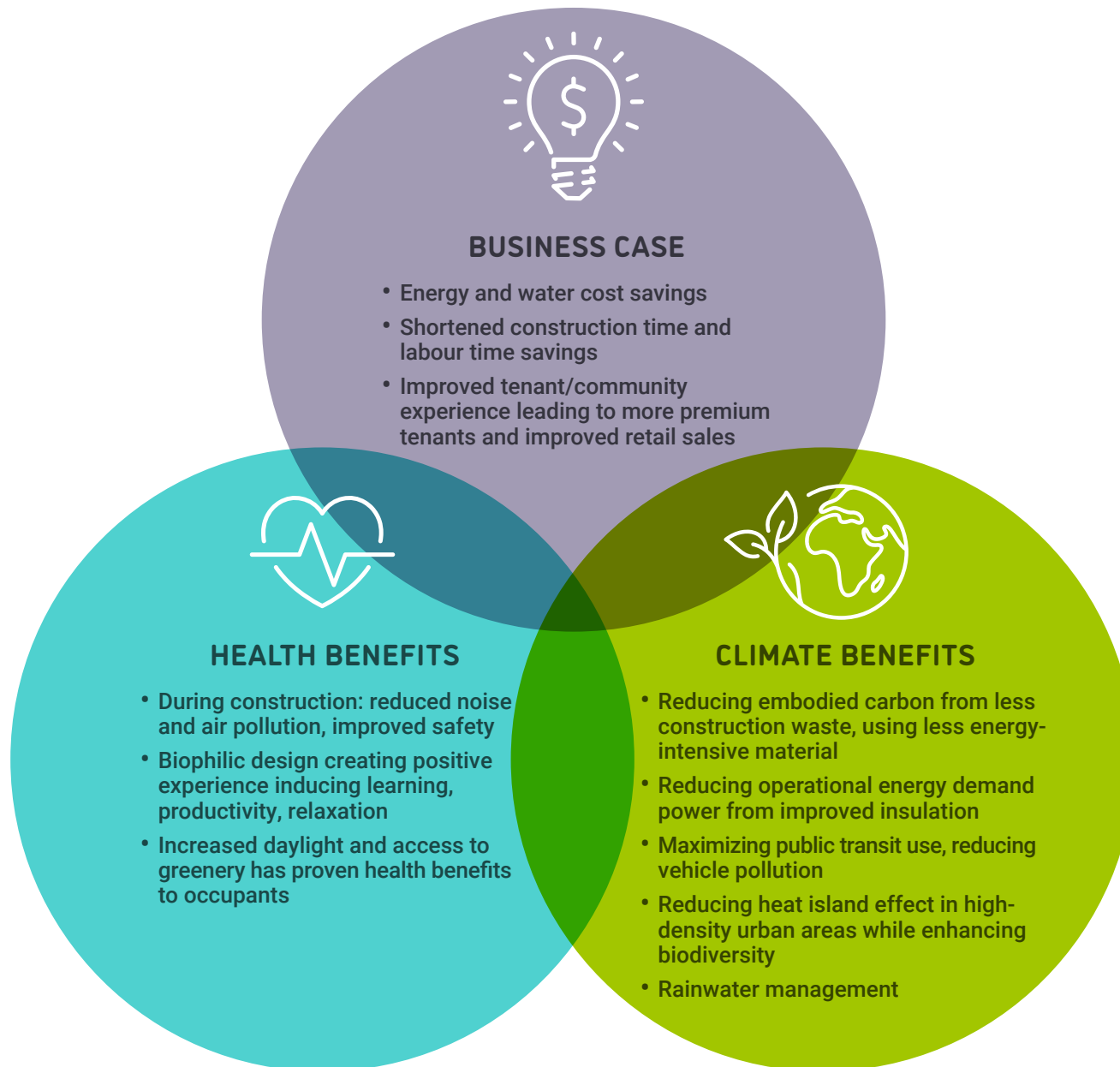
A lack of market data regarding sustainability means NEO relies on external certification to monitor its sustainability performance, using certifications and benchmarks, such as WELL, EDGE and GRESB.

The Philippines is one of the nations most exposed to natural disasters, which has led Seven/NEO to be the pilot project for the International Finance Corporation's Building Resilience Index programme, which aims to define standards for building resilience.

Conclusion

There is a strong business case for initiatives which create both climate and health benefits throughout the development and operating cycles of buildings. Real estate companies which prioritise these co-benefits will better futureproof their portfolios in an increasingly volatile climate and economic environment. A culture of collaboration and knowledge-sharing between cross-functional teams and with external stakeholders is strongly linked to exceptional results.

EXAMPLES OF CO-BENEFITS OF GREEN AND HEALTHY BUILDINGS THAT ALSO CONTRIBUTE TO THE BOTTOM LINE.



Acknowledgements

PROJECT STAFF

Jenny Zhang

Co-Author, Director of ESG and Decarbonization, ULI Asia Pacific

Mark Cooper

Co-Author, Editor of Sustain-RE

Kara Kokernak

Senior Director, Randall Lewis Center for Sustainability in Real Estate

Marta Schantz

Co-Executive Director, Randall Lewis Center for Sustainability in Real Estate

Rachel MacCleery

Co-Executive Director, Randall Lewis Center for Sustainability in Real Estate

James A. Mulligan

Senior Editor

Laura Glassman, Publications

Professionals LLC

Manuscript Editor

Brandon Weil

Art Director

Thomas Cameron

Graphic Designer

INTERVIEWEES AND CONTRIBUTORS

Brandon Ng

Chief Executive Officer, Ampd Energy

Sylvia Chung

Chief Business Impact Officer, Chinachem Group

Jo Lees

Construction Manager, Hines Australia

Kitty Cheung

Senior Marketing Manager and ESG Leader, Hines China

Max Wong

Managing Director of Project & Engineering (HK), Link REIT

Emmanuel Farcis

Director of Asset Management (HK), Link REIT

Ryuta Yoshida

General Manager of Corporate Planning Department, Mitsubishi Estate

Raymond Rufino

Chief Executive Officer, NEO

Vanessa Wo

Assistant General Manager of Corporate Communications, SOCAM Development