

INTELLIGENT BUILDING EUROPE



SMART BUILDING CASE STUDIES

FIVE OF THE WORLD'S
MOST INTELLIGENT BUILDINGS

An Intelligent Building Europe 2020 eBook

INTRODUCTION

Smart building technology is transforming the built environment. It offers huge efficiency savings, and helps business reduce their carbon footprint and energy bills. Buildings equipped with smart technology can also create a healthier, more comfortable experience for occupants, with the ability to control lighting, temperature and air quality to deliver the optimum conditions for good working and healthy living.

This eBook runs down five of the world's most innovative and dynamic smart buildings from Singapore to the United States. These offices, conference centres and skyscrapers all feature systems designed to reduce their environmental impact and improve occupant experience.

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CAPITAL TOWER

Tanjong Pagar, Singapore



Capital Tower is the fourth-largest building in Singapore. Owned by CapitaLand Group, it has become a distinctive presence in the skyline of the city state's financial district. In addition to CapitaLand, the building houses financial services firms and the exclusive private members China Club.

It was built with a host of smart features introduced to improve occupant experience. It also boasts impressive green credentials, with technology designed to make it more energy efficient, sustainable and eco-friendly.

WHAT MAKES IT SMART?

- Motion detectors in the lift lobby and toilets measure room occupancy to ensure energy is only used when people are in the room
- Low emissivity double-glazed glass windows reduce heat penetration and minimise energy consumption
- The building uses condensation from the air handling unit to reduce water usage
- Devices to monitor carbon dioxide and carbon monoxide are installed in the car park and office spaces to ensure optimal air quality throughout the building
- The car park guidance system monitors parking spaces in real time, and displays availability to drivers, as well as directing them to empty spaces
- Smart elevators with dual LCE panels placed to display live news and stock market updates.

Year 2000

Architect RSP Architects Planners & Engineers

Owner CapitaLand Group

Tenant GIC Private Limited,
JPMorgan Chase,
CapitaLand Group

Key numbers 1,387 million, value in
Singapore dollars as of
2019

HINDMARSH SHIRE COUNCIL CORPORATE CENTRE

Nhill, Victoria, Australia



This stylish, high-tech corporate centre was built to display the state of Victoria's technological and ecological credentials.

Nhill—one of the first towns in Australia to receive electricity—has always been ahead of the curve, and this building is designed to enhance the office environment for its employees and promote development in a modern and ecologically sustainable way.

Year 2014

Architect k20 Architecture

Owner Hindmarsh Shire Council

Tenant Hindmarsh Shire Council

Key numbers 60%, the reduction in energy usage compared to the previous building

WHAT MAKES IT SMART?

- A series of underfloor thermal chambers, a ventilation system and an earth pipe heat exchange system draw in fresh air from the exterior, delivering a fresh air supply to the building
- LED lighting systems lower energy consumption and require less maintenance than alternatives
- Solar panels on the rooftop harvest energy from the sun, providing clean, green power to the building
- Crossflow ventilation and zoned motion-detecting lighting improves energy efficiency by ensuring usage matches occupancy
- Vertical green walls enhance indoor air quality by removing carbon dioxide from the air and replacing it with fresh oxygen
- An electronic control and monitoring system measures the effectiveness of the design to minimise energy consumption, controlling maintenance and energy usage

THE CRYSTAL

Royal Victoria Dock, London



Operated by Siemens, the Crystal is a sustainable conference centre and events venue in London's Royal Victoria Dock. It has been designed to form part of a sustainable urban landscape, incorporating greenery and stylish design as well as energy efficient technology.

It's commitment to sustainable has won it plaudits from some of the world's leading sustainability accreditation bodies and is regarded as setting a high standard in green development.

Year 2012
Architect Wilkinson Eyre
Owner Siemens
Key numbers 30 million, cost of British pounds sterling

WHAT MAKES IT SMART?

- Solar panels on its roof generate approximately 20% of the building's power
- Over 3,500 data points are used to monitor and manage water and energy usage, meaning its carbon emissions are 70% lower than comparable office buildings in the UK
- Much of its water is recycled, and water is heated by a combination of solar thermal water heating from the roof and ground source heat pumps
- A building energy management system (BMS) efficiently controls all electrical and mechanical systems in the building, including its heating, cooling and ventilation systems, lighting, and solar thermal hot water system
- Lighting is 65% fluorescent and 35% LED, managed by an advanced control system that automatically adjusts every individual lamp to provide comfortable brightness levels without wasting electricity

DUKE ENERGY CENTRE

Charlotte, North Carolina,
United States



Originally designed as a replacement for Wachovia's One Wachovia Center headquarters in Charlotte, North Carolina, it was intended to be a state-of-the-art, sustainable and efficient corporate base for the firm.

Although that vision was realised, the building was instead occupied by Duke Energy, and has become an iconic fixture in the centre of Charlotte. Each time the Carolina Panthers, the city's American football team scores a touchdown, LED lights colour the tower blue, the team colours.

Year 2012

Architect Thompson, Ventulett,
Stainback & Associates

Owner Wells Fargo

Tenant Duke Energy

Key numbers 880 million, cost in US
dollars

WHAT MAKES IT SMART?

- 16 separate building systems are integrated on one network, including HVAC, security, metering, lighting, water management and emergency preparedness; this reduces operational expenses and energy consumption by 22%
- Digital sensors are used to manage energy consumption, allowing building temperatures to be adjusted within a predetermined range
- A lighting control system reduces energy consumption by dimming perimeter lights in response to available natural light and turning lights off when the room is vacant; the lighting control system learns occupant behaviour over time and automatically adjusts according to long the office will be occupied
- "Destination Dispatch" elevator controls assign elevators to passengers with common destinations, which will then transport them while making the fewest possible stops
- The building reuses approximately 10 million gallons of harvested water each year including groundwater, rainwater and HVAC condensation, meeting roughly 80% of the cooling tower's water needs and 100% of the building's irrigation needs

BURJ KHALIFA

Dubai, United Arab Emirates



One of the most famous buildings in the world, the Burj Khalifa is not only a towering icon of human progress—and the growing wealth of the Gulf states—but also a global leader in smart building technology.

Occupied by hotels, corporate suites and luxury apartments, the sheer size of the building requires elaborate cleaning, plumbing and air conditioning systems that leverage innovative smart technologies.

WHAT MAKES IT SMART?

- The building automation system (BMS) relays real-time information to an IoT platform, which uses smart algorithms to identify anomalies and maintenance issues; this lets facilities improve building maintenance and asset reliability; FMs have reduced total maintenance hours by 40% since launching the system
- The system delivers a unified view of building systems and increases the connectivity of smart devices, letting FMs improve efficiency, increase responsiveness and maximise operational control
- Recycling systems use gravity to discharge water from the plumbing fixtures, floor drains, mechanical equipment and storm water into the city's sewer system
- The air conditioning system draws cooler and fresher air from the upper floors to the ground floors; condensation is collected via a collection system and used to irrigate nearby parkland
- Unmanned cleaning machines clean the top 27 floors of windows and the glass spire

Year 2010

Architect Skidmore, Owings & Merrill LLP

Owner Emaar Properties

Tenant Mixed use

Key numbers 1.5 billion, cost in US dollars