# Smart Buildings are Smart Business

START

How to develop buildings with a sustainable leading edge



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We stand at the forefront of a pivotal moment in Australia's energy landscape. Through technology and sustainability, we have the power to make a profound impact. The urgency to address our pressing energy concerns has never been greater, but with it comes a remarkable opportunity to make a positive impact. By transforming traditional buildings into intelligent, energy-efficient ecosystems, we optimise consumption, minimise waste, and pave the way for a future powered by clean energy. Together, we inspire change and shape a legacy of transformative impact — one smart building at a time.

#### Matthew Doley

National Market Development Manager Smart Buildings-ABB Australia





## A time of change for commercial buildings

Economics, urbanisation and climate





## A time of change for commercial buildings

Australia's energy insights in numbers\*



Almost 90 percent of business leaders feel that fluctuating energy costs and instability pose a threat to business profitability and competitiveness.



**36 percent** of businesses have reduced spending in key areas including recruitment and technology - in response to the higher energy prices.

\*ABB Energy Insights Survey January 2023





77 percent are concerned about the security of energy supply, with over half highlighting the impact on their decarbonization goals.



**53 percent** of leaders say the cost of energy will **delay them in meeting their sustainability targets** by up to 12 months.



## A time of change for commercial buildings

Urban space is at a premium as cities become more densely populated.

In July 2020, the world's population was estimated **at 7.8 billion**<sup>1</sup>

A growing population demands more dynamic management of every building's space to accommodate a more fluid workforce and more careful stewardship of our energy and water resources. The contribution of buildings to climate change is under a microscope.



Buildings consume more than 30 % of the world's energy

Buildings consume more than 30 percent of the world's energy and contribute almost 40 percent of global carbon emissions<sup>2</sup>. Building green is no longer a luxury option. Many clients, tenants and occupiers now regard it as standard. Building developers are expected to include active emission<sup>2</sup> mitigation technology in their developments from the outset.

#### 1. United Nations Department of Economic and Social Affairs, 2018

2. The National Human Activity Pattern Survey (NHAPS) 2001





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## **Greater regulation**



In an effort to tackle these challenges, national governments across the world are imposing tighter restrictions on building use, energy consumption and emissions.

Shifting to more energy-efficient buildings is now regarded as central to carbon reduction strategies.







## **Greater regulation**





## The future is smart

Cities have no choice but to evolve



4. IMD-SUTD Smart City Index Report from The International Institute for Management Development (IMD) and Singapore University of Technology and Design (SUTD), 2020



portfolio.



together.









What is new is the addition of web-based platforms to allow these verticals to integrate seamlessly with each other.

They can deliver a single view of how efficiently and effectively a building operates. Armed with this data, managers can take proactive steps to avoid waste and improve use, cutting emissions and making savings at the same time.









Vast amount of data generated by buildings

The vast amount of data generated by buildings transform them into iterative learning loops. Sensors in a building track the use of assets and resources and can adapt to the changing consumption or activity patterns that take place.



Buildings can make **autonomous decisions** 

Using pre-installed algorithms, buildings can make autonomous decisions on things like adjusting lighting and HVAC levels, to reflect time of day, external environment, occupancy levels or any other variable.



# **Create recommendations** for the reuse of spaces

Readings recorded by these smart systems can also be used to create recommendations for repurposing under-utilized systems, rooms or zones within a building.

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Any autonomous decision can be tracked in real time on a digital dashboard by managers who are able to intervene at any point.

Access to this level of visibility and control is probably the greatest benefit of choosing to build smarter.







## The ROI of smart

There are several real benefits of smart buildings for developers and owners

First, building smart ensures resources are used sustainably. As a building adapts to the demands of its users, or the goals of its managers, it can save energy, cut emissions and reduce energy costs.





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## The ROI of smart



More effective and efficient use of power can save money, quickly repaying initial technology expenditure. HVAC and lighting alone can account for about 50 percent of energy use in an average commercial building. By incorporating smart automation, managers may see decreased energy costs of 30 to 50 percent.

Comparing energy savings to the falling cost of installing a basic smart management system, smart buildings immediately prove their worth. If a smart system delivered an energy cost saving of 25 percent, with an installation cost of \$37,500 USD for a 50,000 ft<sup>2</sup> building, the annual savings could be \$23,000 USD annually, with a payback period of less than two years<sup>5</sup>.

5. HSBC. Smart Buildings Cut Emissions. March 2020

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## Smart buildings can make a profit

Roof space given to photovoltaic arrays can generate power that is stored in batteries in the building.

Excess power can in some cases can be sold back to the grid, making the building energy positive and creating an additional revenue stream for building owners.













Solutions to reduce operational costs **by up to 30%** 



## Safety

Helping personnel manage critical events and **minimizing repair and service time** 





Patented load management system integrated into metering allow marked reductions in **CO2 emissions** 

### Reliability

Monitor, prevent, enable predictive maintenance and reduce intervention time to ensure continuous operations





## **Mission to Zero**

ABB's Lüdenscheid site is ABB's first carbon neutral factory of the future



#### **Mission to Zero:**

ABB's CO2-neutral factory Lüdenscheid, Germany



#### A smart solution:

Lüdenscheid integrates a range of technologies into one intelligent system, which is digitally networked and controllable. On sunny days, solar technology generates up to 100% of the factory's requirements, enough to supply 340 private households. When used in conjunction with the site's cogeneration plant, Lüdenscheid can generate 14% more energy than needed. This surplus can be sold back into the public grid, meaning that the site is energy positive.



#### Outcome:

The flagship facility saves up to 630 tonnes of CO2 a year. The site makes a significant and long-term contribution to improving the environment both locally and for the wider community.

CASE STUDY ABB'S CO<sub>2</sub>-NEUTRAL FACTORY

ABB presents state of the art solution for CO₂-neutral and energy self-sufficient factory of the future at its site in Lüdenscheid





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Building smart minimizes maintenance costs.



Predictive fault-finding can save maintenance time and labor, as well as minimizing downtime for expensive equipment or services. Some estimates suggest that smart-enabled predictive maintenance is 3 to 9 times cheaper than a traditional reactive approach<sup>6</sup>. Tenant and occupant satisfaction are often also higher as systems that experience failure can be identified, repaired and re-booted quickly.

6. Construction21 International. Smart buildings: predictive maintenance is crucial. 2019

Smart buildings are more resilient to power outages.



#### Maintaining power is critical in most businesses

Maintaining power is critical in most businesses, but this is especially true for hospitals where power outages could be life threatening. Smart technology can be used to ensure intensive care or surgery wards remain powered, even when power is lost elsewhere.





Smart technology adds tenant appeal.



Many tenants consider the effect that building selection has on their own brand. In a world where investors, clients and prospective employees interrogate companies for their sustainability and CSR strategies, a building with smart environmental management systems can be a dealmaker.

Research by USGBC, the developers of the LEED certification scheme, points out that 79 percent of those working in a LEED-certified building say they would choose another job in a LEED-certified building over a non-LEED building. Workers in LEED certified green buildings also reported feeling happier, healthier and more productive<sup>7</sup>.

7. US Green Buildings Council 2018







Smart technology revitalises older building stock.



At least 40 percent of the buildings in Europe were built before the 1960s.

These currently rely on forms of passive energy management that are often deeply embedded in the fabric of the building itself; insulation, double glazing, flooring and so on.

The majority of methods are highly inefficient. They do not actively respond to how the building is used, nor are they easily adjustable. Even buildings erected as recently as the 1980s consume up to twice as much energy as new constructions. Data from the European Parliament suggests the same ROI benefits enjoyed by new builds can be quickly realized by older ones. For instance, deep renovation of a building could reduce demand for heating by more than 70 percent.



Lower energy costs, lower maintenance costs and fewer voids are all achievable from day one.

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## Case Study: FK Vienna Generali Arena



#### Intelligent Football Stadium

Generali Arena - Vienna, Austria The electrical systems of the 95-year-old FK Vienna Generali Arena in Austria were no longer suitable for a large, professional soccer stadium.



#### A smart solution

ABB retrofitted the stadium with the latest in smart building technology, including a comprehensive range of energy-saving building control solutions to improve visitor experience. VIP areas are controlled via integrated Busch-SmartTouch panels, and light switches have been designed in the club's famous violet colours.



#### Outcome

As the first sustainable football venue in Austria, the stadium has become a modern sporting showcase for connected, safe and energy efficient spaces and delivers a unique experience for fans.

CASE STUDY ABB'S CO₂-NEUTRAL FACTORY

ABB creates 'intelligent' football stadium for FK Austria





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## Smart technology



Smart technology changes the way far-sighted owners view their buildings.



Integrating smart technology into your building development **is a strategic decision.** 

It should be clear by now that a smart building is more than just as a cluster of products in a physical environment.

Owners and investors are able to adapt goals and plans as use patterns of the asset play out in front of them in real time. Data visualization means scenario plans can consider the longer-term management of the space. By using a 'digital twin' owners can experiment with changes of internal configuration or even consider entire changes of use to maximize asset value, all while controlling its consumption of resources.









The building itself becomes a platform for a host of different digital systems, services and functions which can change to match the owners' strategy. This 'Building as A Service' (BaaS) model has far-reaching implications for building lifespans, making it relatively easy to switch building functions over time and potentially sidestep obsolescence altogether.

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## Your smart building project starts here







## Four pillars for smart building development

The most successful and future-proof smart buildings were developed using four key pillars





## Pillar 1: Assume nothing



If you want to avoid expensive mistakes, start with an open mind. Never consider solutions until you have listened carefully to what all the stakeholders want the building to achieve now and in the future.



You have to start with a complete, holistic view of the building you're dealing with. Not every type of building is the same. Micro-segment and find the right solution for each one.

MATTHIAS WINKLER GLOBAL DIVISION INDUSTRY SEGMENT MANAGER 'BUILDINGS', ABB





## Pillar 1: Assume nothing

Key actions



The built environment is becoming more complex and competitive as each year passes. Buildings are growing increasingly sophisticated and costly to erect. It's increasingly important to think of a building holistically, rather than focus on individual systems or features.

Many buildings are built with an eye to future expansion or change of use during their lifetime. One type of solution does not fit all projects. And the solution for today may well not be right tomorrow.



Get early buy-in from all stakeholders via a workshop or round table sessions to help eliminate negative push-back later.



Think seriously about how the building may evolve over time and what this might mean for its needs. Make your project future ready.





## Pillar 2: Work backwards

Buildings are created for people. Every build or refurbishment project should begin with a thorough exploration of how people will use the building and what a successful visit would look like. Think of this as the vision or mission for the building.



People in a building are trying to achieve something. Those people need to be at the forefront of your planning.

#### BETH RAY

HEAD OF GLOBAL PRODUCT MANAGEMENT COMMERCIAL BUILDING AUTOMATION, ABB





# Pillar 2: Work backwards

Key actions



Once all of those involved in the project understand the vision, you can work backwards as a team to design the most appropriate solution architecture.

Be sure that everyone understands the goals of all stakeholders including investors, owners, tenants, occupiers and even the wider city or national government before any planning begins. When you consider all of these different perspectives at the outset you can avoid misunderstandings later down the line.



ACTIONS

Research with eventual building users can help you prioritize needs and goals.



Ensure everyone shares a clear, simple vision for what you're trying to achieve. Try to condense this to a single inspiring sentence if possible. Consider workshopping this sentence with your stakeholders if it lacks clarity or there's no consensus.

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## **Pillar 3: Collaborate**



Collaboration will be at the heart of your success. Smart technology is a web of switches, sensors and devices that need to knit seamlessly together.



Creating a successful building is about creating that same unity when it comes to people's viewpoints, expertise and expectations.





## **Pillar 3: Collaborate**



are essential for aligning on ways of working, agreeing key milestones, setting and managing expectations and dealing with roadblocks.

thinking are the two biggest enemies of effective smart technology adoption.

MORE COMPLETE **KNOWLEDGE OF** APPLICATIONS



POTENTIAL OF INTELLIGENT **TECHNOLOGY** 





## **Pillar 4: Stay flexible**

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Smart technologies are constantly evolving, and so is the thinking around smart building. Many buildings have lifespans counted in decades and will need the facility to adapt to new demands, absorb new technologies or change core function.







# **Pillar 4: Stay flexible**

Key actions



As you embark on your electrification process it's wise to be similarly adaptable and open to new opportunities, challenges and even constraints. Adopt an agile mindset. Test and learn and test again.

Be unafraid to experiment with new ideas and solutions but also uncompromising on efficiency, productivity, quality and safety. This can be challenging and takes commitment and strong team alignment.

Think big, but start small – this allows a more iterative, test and learn approach to your project.

Use industry blogs and social media to follow the latest developments and freshest thinking to apply to your projects.

Think ahead. Buildings live for decades and their functions can change. Being open minded can help take into account how the needs of the building's users might change in years to come.

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There has never been a better time to adopt smart building technologies. Intelligent buildings that would have been unimaginable a few decades ago are now a reality. And as technology advances we can expect even greater leaps forward.













We can expect more of the everyday building functions to become automated.

Smart offices will become independently intelligent, learning how occupants use the space and services and then proactively adjust lighting, HVAC and other systems to maximize health and comfort. Buildings will recognize people entering.

Buildings will recognize employees as they arrive at work, direct them to an EV charging point and then on to a workstation configured to meet their requirements for a productive day's work. Visitors to an overseas office will be recognized as they arrive and automatically checked-in with all the appropriate access rights and personalized settings. Buildings of all kinds will become energy positive and carbon negative.

More offices, hospitals, malls, stadiums and homes will capture and store renewable power from the sun and wind. Many will supply power back to the grid or to EVs charging on site.







Becoming more energy-efficient means buildings help combat climate change.

Elimination of fossil fuel use combined with carbon-capture materials in the fabric of the building will mean buildings 'switch sides' to start playing an active role in cleaning our cities and combating climate change. Smart technology in buildings will also keep us healthier for longer.

for longer

Healthier

Hospitals will check patients in from the ambulance and assign a room and medical team before the patient arrives. Environmental control in hospitals will monitor oxygen and CO2 levels, lighting and heating to optimize the conditions for each patient's recovery. Ultimately, we can start to view buildings as blank platforms for smart technologies.

Platforms to enable **smart technologies** 

Subscription-based Building as a Service (BaaS) models may go mainstream in the next decade. These will allow building owners to download a turnkey software package that quickly transforms a suitable physical shell into a digital hospital, a hotel, a university department, an office HQ or a residential home for the elderly.









Building owners will enjoy previously impossible flexibility to respond to market opportunities by quickly changing their building's operating system and repurposing their asset. Building obsolescence could become a thing of the past.







## Creating buildings of the future, today







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## Creating buildings of the future, today

At ABB, we believe that the global rise of smart building technology is an opportunity for smart developers, owners and investors. It will provide significant sustainable and financial benefits, as well as answering social and environmental needs.



For those who approach building development with a collaborative and open mindset, smart technology is an opportunity with business-transforming potential.



## Creating buildings of the future, today

As a technology pioneer for 130 years, ABB has market-leading expertise in smart building electrification and integration.

Along with the breadth of the ABB automation offer, ABB Ability<sup>™</sup> boasts more than 200 digital solutions across industries, each of them the result of collaboration and partnership with our global customer base. We deliver value by bringing future solutions to you, today.

Wherever you are on your journey, talk to ABB now, and learn how we can deliver a leading edge to your smart building project.

TECHNOLOGY PIONEER +200 E DIGITAL SOLUTIONS

**Future** 

## Talk to us

We keep your electrical system installations at the highest level of availability and safety, giving you access to real-time data from across your operations. The benefits of connectivity and data availability can result in savings up to 30%.



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