

The future of sustainable real estate is smart

How to convert decarbonization and net-zero challenges into new and profitable opportunities

Climate change is a critical issue for the real estate sector, which contributes nearly 40% of global carbon emissions. Climate risk is also an opportunity to create solutions that enhance operational efficiency, generate new revenue, and improve returns and asset values at the same time they reduce environmental impact. In this report, we'll explore the increasing pressure from stakeholders to mitigate the effects of buildings on climate change, the benefits of smarter green buildings, and actions that real estate companies can take to chart a profitable and revenue-accretive path across the real estate life cycle.



Much is at stake

Climate change is gaining significant prominence throughout the world, with more instances of extreme and inconsistent weather conditions having a tangible, negative impact. In 2019-20, for example, Australia faced one of the worst wildfires in its history, one that affected millions of hectares in land and billions of animals.¹ Many countries in Europe have recently experienced temperatures soaring above 45° Celsius and huge wildfires leading to hundreds of deaths and thousands requiring evacuation.²

Canada is warming at double the global average—and its northern region at three times the average.³ Globally, one of the greatest contributors to the problem is the building sector, which is responsible for nearly 40% of annual greenhouse gas (GHG) emissions.⁴ For cities like Toronto, building emissions comprise 55% of total emissions.⁵ And more than 85% of emissions from the Canadian buildings sector come from energy used in space and water heating—specifically, those powered by fossil fuels.⁶ This presents an important challenge to do better in one of the country's most important industries.

For the Paris Agreement, Canada committed to reduce its emissions to 40-45% below 2005 levels by 2030 and net-zero by 2050. However, as of 2019, emissions from Canadian buildings increased more than 8% compared to 2005.⁷ Projections from the federal Department of Environment and Climate Change show, even after accounting for the impact of different initiatives, a 29% reduction in GHG emissions from buildings by 2030. That's still short of the target 40-45%.⁸

According to the Pembina Institute, a non-profit think tank focused on Canada's clean energy transition, **reaching the net-zero target by 2050 would require retrofitting nearly 600,000 homes and 32 million square metres of commercial space every year until 2040, at a cost of \$20 billion each year.**⁹ As nearly 80% of existing buildings will still be standing in 2050, this will be challenging—but it will be crucial for Canada to fulfill its Paris commitment.¹⁰ Further, any new construction will have to follow net-zero standards. Considering it takes on average three to five years to design and complete a typical construction project, the window to meet 2030 targets is rapidly closing.

Clearly, more needs to be done by real estate owners, developers, and operators to retrofit existing buildings and embed net-zero aspects in new buildings. The Climate change threat is also an opportunity to create solutions that simultaneously decrease costs, enhance operational efficiency, and generate new revenue while reducing environmental impact.

In this report, we'll explore increasing pressure from stakeholders to mitigate the effects of buildings on climate change, the benefits of smarter green buildings, and actions that real estate companies can take throughout the real estate life cycle to ensure more positive outcomes.



Putting **sustainability** at the core of their real estate investment decisions, investors are setting net-zero goals for their existing portfolios and new investments.

Stakeholder pressure and building costs are increasing

Investors are moving swiftly to decarbonize their portfolios

Putting sustainability at the core of their real estate investment decisions, investors are setting net-zero goals for their existing real estate portfolios and new investments. To ensure decisive action by investee companies, investors and asset managers are themselves committing to net-zero goals and forming climate initiatives and alliances. For example, BentallGreenOak (BGO) has committed to achieving a net-zero carbon portfolio, in line with the Paris Agreement, and has also set up a global net-zero framework to enable collaboration between portfolio, asset, and property managers to design and reach interim carbon reduction targets.¹¹ BGO has also joined the Net Zero Asset Managers initiative.

This initiative has 273 signatories with US\$61.3 trillion of assets under management.¹² Among other things, each signatory pledges its organization to work with asset-owner clients on decarbonization goals, set interim targets for 2030, and publish disclosures as per the Task Force on

Climate-Related Financial Disclosures (TCFD) to ensure transparency and accountability. As more investment managers commit to decarbonizing their real estate portfolios, real estate owners could come under increased pressure.

Tenants are demanding healthier and more sustainable spaces

The COVID-19 pandemic has elevated health and wellness as a key consideration for tenants selecting properties. As in the case of the return to the office after public health shutdowns, **tenants now have to “earn the commute” of their employees and so they’re seeking healthier spaces that provide superior indoor air and water quality, ventilation, daylight, thermal comfort, catering services, sanitization, and facilities that support mental health.** These features are now must-haves.

Tenants want to increase productivity and talent retention in a tight labour market and are aware that smarter green buildings can provide these benefits. For instance, according to the World Green Building

Council, **studies show up to 11% productivity gains from improved ventilation, up to 23% productivity gains from improved lighting design, and substantial improvement in employee retention through green retrofits.**¹³

Conscious about the carbon footprint of their leased spaces, tenants are looking for more environmentally sustainable buildings.¹⁴ This trend is not limited to private tenants; it’s evident in government leases as well. By 2030, the federal government, under its Greening Strategy, has committed that 75% of its new office leases and lease renewals must be in net-zero carbon and climate resilient buildings.¹⁵ Tenants are also in a dilemma on future expansion of their leased space as increased work from home, reduced travel, and lower parking needs are helping reduce their emissions and carbon footprint.

Regulations on buildings and emission codes are tightening

The Canadian government's 2030 Emission Reduction Plan commits \$9.1 billion of new investments for different sectors of the economy, ranging from buildings to transportation to oil and gas.¹⁶ Meanwhile, the regulatory landscape is shifting:

- 2020 building codes from the Canadian Commission on Building and Fire Codes feature a tiered approach to energy efficiency, leading to most new buildings having to be constructed to net-zero energy ready (NZER) standards by 2030.¹⁷

- Building codes and energy efficiency requirements are likely to get stricter in the coming years, as building codes affect up to 70% of energy use and are a key tool for reducing emissions.¹⁸
- Net-zero emission building codes and model retrofit codes for Canada are expected to be released by 2024.¹⁹

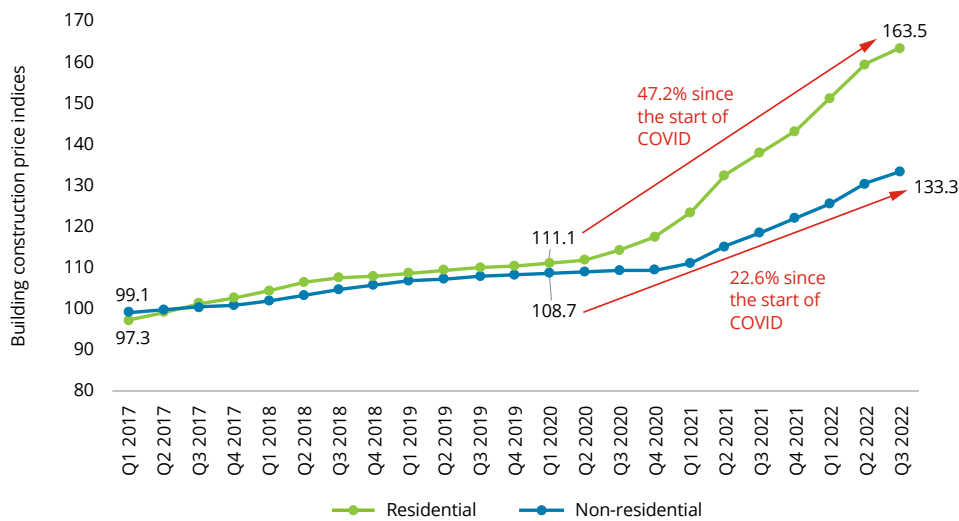
Looking at international trends, the United Kingdom could be a lead indicator with the Minimum Energy Efficiency Standards (MEES). It's expected that by 2030, all commercial buildings in England and Wales will need to meet level B in the Energy Performance Certificate rating system (the current minimum requirement is E).²⁰

To put things in perspective, this change could impact 85% of rented commercial properties in those two countries.²¹ And in London, it could render 80% of office stock obsolete and illegal to rent unless it's upgraded.²²

Construction costs and project completion times are rising

In the third quarter of 2022, building construction costs soared to an all-time high in Canada, with costs for residential buildings rising 47.2% since the start of COVID in Q1 2020 and non-residential buildings up 22.6% in the same period (see Figure 1).²³

Figure 1: Building construction costs are soaring



Source: Statistics Canada Table 18-10-0135-01, Building construction price indexes, by type of building. Based on 11 census metropolitan areas (CMAs) covered by Statistics Canada. Data as of November 2, 2022.

Increases in labour costs, material costs, fuel prices, and supply chain constraints drove the surge. Labour costs are rising due to increased wages and higher vacancies in construction trades.²⁴ Material costs rose because of soaring prices for lumber and other wood products (up 34.5% since Q1 2020), fabricated metal products and construction materials (up 42% since Q1 2020) as well as plastic and rubber products (25.9% since Q1 2020).²⁵

The latter two also caused an increase in plumbing and electrical product prices, while rising fuel prices nudged up transportation costs for construction materials. With high inflation and global supply chain issues, construction costs may remain high.

Furthermore, building construction times vary between one to three years for a typical commercial project (new and

retrofit); with time running out to meet energy-efficiency and GHG emissions-reduction goals, real estate companies must act now to make the necessary upgrades and retrofits to existing buildings and to implement net-zero standards at the design stage for new developments.

ESG performance is starting to have a measurable impact

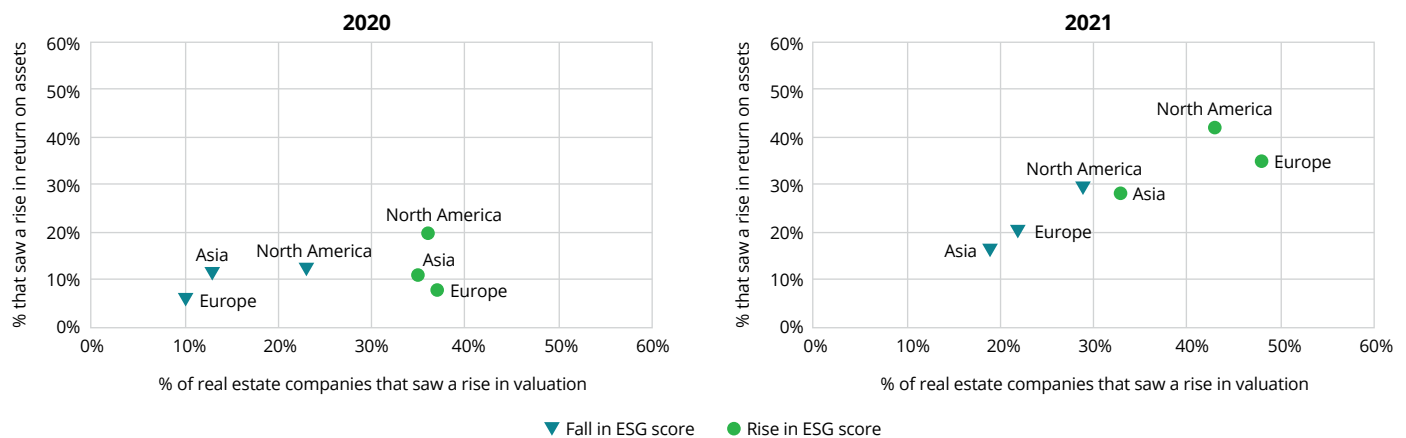
Deloitte Canada's Real Estate practice analyzed more than 250 real estate companies around the world to understand the trends in their environmental, social, and governance (ESG) performance, returns, and valuation. We studied the changes in ESG scores in 2020 and 2021 and compared them to an increase in return on assets (ROA) and enterprise value/earnings before interest, taxes, depreciation, and amortization (EV/EBITDA) ratios in those respective years. We found that, in both the years, a higher percentage of companies exhibited an increase in returns and valuation when their ESG performance rose compared to when it fell. In other words, an improvement in ESG performance is starting to show a positive impact on returns and valuation (see Figure 2).

Among regions, Europe showed the highest alignment of positive ESG performance with valuation, with a considerable increase in alignment with returns in 2021. In that year, 48% of European real estate companies experienced an increased in valuation when ESG scores increased, compared to only 22% when ESG performance fell. North America was the front-runner in positive ESG performance corresponding to an improvement in returns. In 2021, 42% of real estate companies there saw an increase in returns when ESG performance rose compared to only 29% when the performance fell. For Asia, the differential impact of positive ESG performance was less on returns in 2020,

when only 11% of real estate companies experienced an increase with a rise in ESG performance. That changed in 2021, with 28% reaping an increase in returns.

While this demonstrates an increasing alignment between ESG performance and asset returns, it also reveals that investors in North America and Europe may be starting to give a valuation premium to companies that are performing better on ESG aspects. The business case to invest in ESG initiatives is becoming stronger; where such initiatives are delivering positive performance, the investment may be recovered through the increase in overall ROI and asset value.

Figure 2: Better ESG performance is starting to align with higher asset returns and valuation



Sources: Refinitiv data and Deloitte analysis

Methodology

We analyzed over 250 listed real estate companies with revenues of US\$50 million and above. We examined the rise and fall in ESG score of each company and compared it to the increase in return on assets and EV/EBITDA in terms of directional alignment. This was done for 2020 and 2021. We then calculated the

proportion of companies, by region, for which the rise and fall in ESG scores aligned with a rise in both ROA and EV/EBITDA.

We used Refinitiv data on ROA, EV/EBITDA, and ESG scores. Refinitiv ESG scores are based on the relative performance of ESG factors with the company's sector

(for environmental and social) and country of incorporation (for governance).

It is important to note that our analysis highlights the directional alignment between the rise in ESG scores and corresponding rise in returns and valuation—it does not assert direct causation.

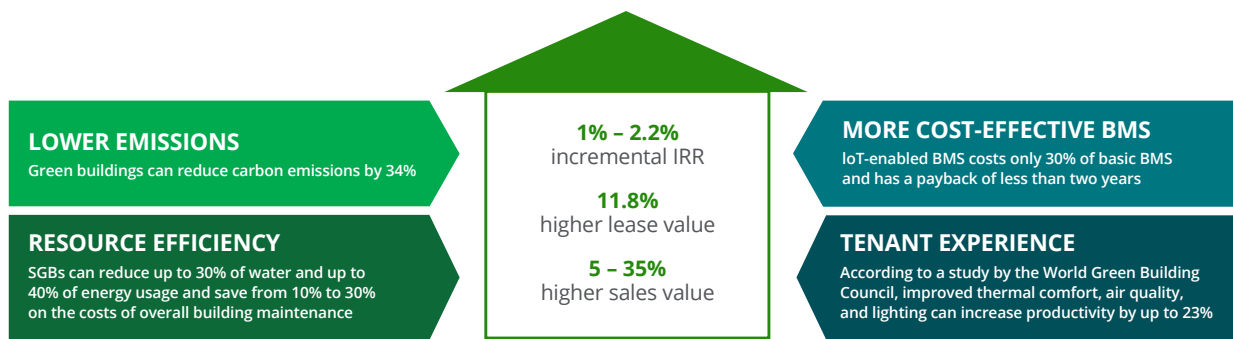
Smarter green buildings offer many financial and environmental benefits

Developers, owners, and operators should not consider green buildings in isolation, because technology is integral to achieving the benefits. While point solutions can bring some benefit to targeted areas, a holistic and integrated digital plan helps achieve true value.

For environmental efficiency, smart green buildings (SGBs) can help owners and occupants reduce up to 30% of water, 40% of energy usage, 10% to 30% of overall building maintenance costs,²⁶ and reduce carbon emissions by 30 to 40% every year.²⁷ In addition, SGBs can help reduce the building load and peak demand, leading to

lower utility costs and a decreased burden on the macro-grid to manage capacity issues. Internet of Things-enabled building management systems cost less than a third of traditional systems, with a payback of less than two years.²⁸ Furthermore, studies show that with improved thermal comfort, air quality, and lighting, real estate companies can enable tenants to increase their productivity by up to 23%.²⁹ Overall, SGBs can provide 11.8% higher lease value with 5% to 35% higher sales value.³⁰ In one of Deloitte's earlier studies based on a discounted cash flow model, green buildings can provide a 1% to 2.2% incremental internal rate of return as well (see Figure 3).³¹

Figure 3: The advantages of smarter, greener buildings



Sources: see endnotes 20-26

Recommendations for real estate companies

With increased stakeholder pressure and rising construction costs, a do-nothing or wait-and-see approach is not an option. The later a company adopts smart technologies, the higher the costs and the greater its risk of obsolescence.

As stakeholders continue to push real estate companies to act on environmental sustainability, companies should realize that it is not just a cost play—there are enough pull factors to help them navigate a profitable and revenue-accretive path across the real estate life cycle of design, build, and operate.

Design

Design is the most critical stage for enabling a net-zero future and overall sustainability. It should be done thinking about operations and Day 100 (long term) of building usage, not only about Day 1 (short term). If done right, it can account for the bulk of overall project savings.

Design for reuse

Tomorrow's buildings should be designed for circular economy principles such as flexibility, reuse, disassembly, and adaptability. **In today's dynamic environment, value will not be generated by permanence but by being able to adapt to the right use at the right time.**

Companies should follow a design for disassembly and adaptability (DfD/A) approach and encourage innovative design practices, keeping in mind the full life cycle of buildings and materials. Ease of dismantling buildings and reusing their materials can reduce waste and embodied carbon. According to the National Zero Waste Council, doing this instead of renovating or demolishing buildings could save 2.5 million tonnes of waste and 1.3 million tonnes of embodied carbon each year in Canada.³²

Choose a zero-carbon building (ZCB) design

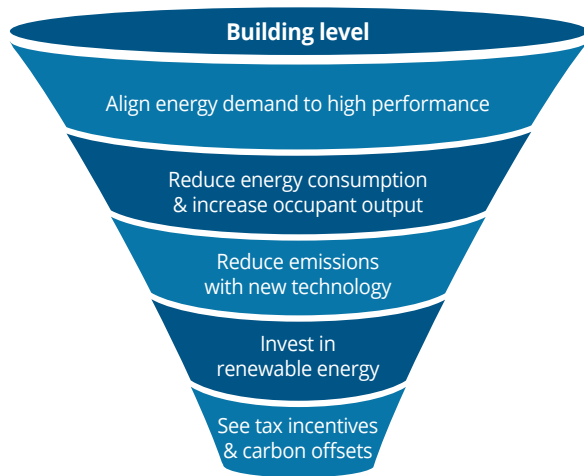
To effectively manage environmental impact far into the future, RE companies should adopt a ZCB approach during the design phase. ZCBs can be created to minimize emissions and generate renewable energy, onsite or offsite, to further reduce exposure to emissions, and to increase energy efficiency. Buildings designed today will be around in 2050 and by then they will have to be net-zero; following a zero-carbon approach today can save companies from costly retrofits of equipment, ventilation systems, and building envelopes, and reduce emissions from demolition as the buildings could potentially be reused.

A Canada Green Building Council study found that ZCBs are both technologically feasible and financially viable.³³ Overall, they can provide incremental returns of 1% above baseline, 24% annual operating savings, and 91% emission savings from onsite measures over a 25-year life cycle, with a modest 8% incremental capital cost.³⁴

By property type, low- and mid-rise office buildings provide the best incremental returns—3% above baseline—with just 4% incremental capital costs.³⁵ These returns will only improve in future as carbon pollution costs (carbon taxes, emissions trading systems, etc.) rise over time.

Companies should adopt an integrated design process (IDP) wherein all decision-makers, including the contractors, are aligned from Day 1. Design is compromised when different stakeholders work in silos, while collaboration yields many benefits. For example, when architects work well with mechanical engineers, the building envelope, the massing, and the form will work to lower the building loads significantly to reduce the costs and the size of the mechanical systems. And if the initial load and energy consumption is reduced significantly, the size and quantity of the renewable energy sources required will also decrease greatly.

Figure 4: The decarbonization value framework



Source: Deloitte Financial Advisory & Risk Advisory

Consider AI-powered generative design³⁶

The rise of artificial intelligence (AI) and cloud-based processing has created a wealth of opportunities across all industries. Real estate is no different. Generative design creates a virtual testbed to create many versions of a design solution to find and model the ideal scenario for a project based on architecture, site constraints, and financial outcomes. Building and energy use, building height, construction area, cost of construction, GHG emissions targets, number of residents, availability of green space, access to natural light, connectivity, and proximity to transport are examples of datasets that may be used.

A generative design process then renders this information into hundreds of typologies and spatial development options. Each typology is tested, validated, and compared, based on simulating various conditions, until the model achieves the desired performance according to project success criteria. **In essence, thousands of hours of design evolution are being condensed into a single afternoon** (based on the power of the processor running the computations). Instead of doing feasibility analysis and concept design, human designers can focus on creative decision-making related to experience design, while relying on data-driven feasibility and project resilience calculations.



Build

Use building information modelling

Building information modelling (BIM) continues to be a game-changer, evolving older practices of computer aided drawing away from drawing and toward information management. **While BIM can be applied to projects at any time in their life cycle, it's an important staple of project development and execution as it helps drive project precision, quality, and cost management.** Establishing BIM right at the start of a development has many benefits and empowers owners and developers to improve sequencing during construction, enhance site and data safety, assess construction progress more actively, and ensure better coordination between stakeholders (see Figure 5).

Overall, BIM's efficiency helps to save resources and reduce wastage. Some of the notable benefits include:³⁷

- Time savings of up to 80% in generating cost estimates
- Up to 40% reduction of unbudgeted project changes
- Savings of up to 10% of the contract value due to timely clash detections
- Overall time savings of up to 7%
- Cost estimation accuracy within 3%

In addition, BIM helps reduce the need to rework projects, reducing document errors and omissions by 30% to 60% and claims litigations by 17%.³⁸

Use more sustainable and bio-based materials

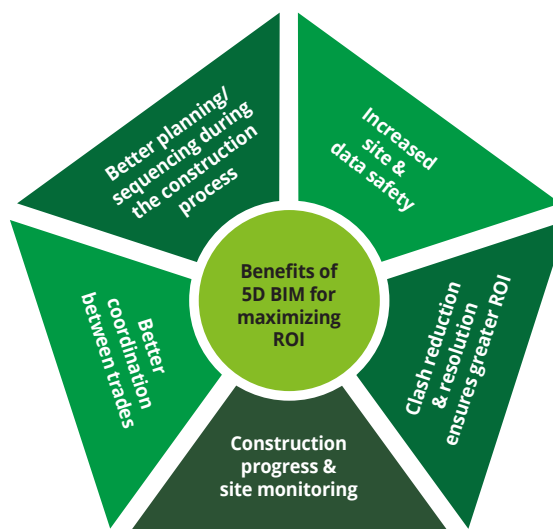
Nearly 11% of annual GHG emissions come from embodied carbon in building materials and construction.³⁹ Using more sustainable materials such as mass timber, low-carbon concrete, hempcrete, and bio-based materials rather than only steel and concrete can greatly reduce emissions and embodied carbon during construction.

The Government of Canada is leading the way with plans to reduce the embodied carbon of structural materials in its major construction projects by 30% starting in 2025 by using recycled and lower-carbon materials, material efficiency, and performance-based design standards.⁴⁰ Another leader is an **Ontario-based company** specializing in the design, fabrication, and assembly of modern timber buildings that's constructing the first mass-timber office building in Waterloo, Ontario. It's a three-storey, multi-tenant office project of 30,000 square feet featuring innovative wood products such as glulam beams and columns, and long-span cross-laminated timber floors. Using such materials, the stakeholders not only aim to enhance the building's sustainability but also achieve optimal efficiency, flexibility, and aesthetic quality. For the health of the tenants, the structure will have a living-wall biofilter system to clean the air naturally and enhance indoor air quality.⁴¹

Favour modular construction and 3D-printing techniques

In Canada, nearly four million tons of construction materials are sent to landfills annually, representing an estimated 1.8 million tonnes of embodied carbon.⁴² Using prefabricated, modular, and 3D-printing construction techniques can reduce emissions and waste produced during construction while at the same time reducing the construction time and increasing worker productivity compared to traditional on-site construction methods. In addition, weather-related construction issues are minimized because workers and materials spend the bulk of their time indoor and/or off-site. A UK research paper found that **off-site and modular construction can increase productivity by at least 50% while reducing costs and construction time by between 20% and 50%.**⁴³ With less waste generation and more recycling, landfill waste is reduced by at least 70%.⁴⁴

Figure 5: Five-dimensional BIM includes the cost considerations



Source: Deloitte analysis

Operate

The majority of the buildings that will be operating in 2050 are already in service today. Owners and operators will need to focus on necessary retrofits and digital transformation to realize the benefits of smarter green buildings, while achieving their decarbonization goals on the way.

Enhance digitalization and data-centricity

Reaching their decarbonization goals and generating new opportunities for owners and operators cannot happen without digitalization and data-centricity. To build a strong foundation, companies need to deploy an agile operating platform to collect, analyze, and assess real-time data

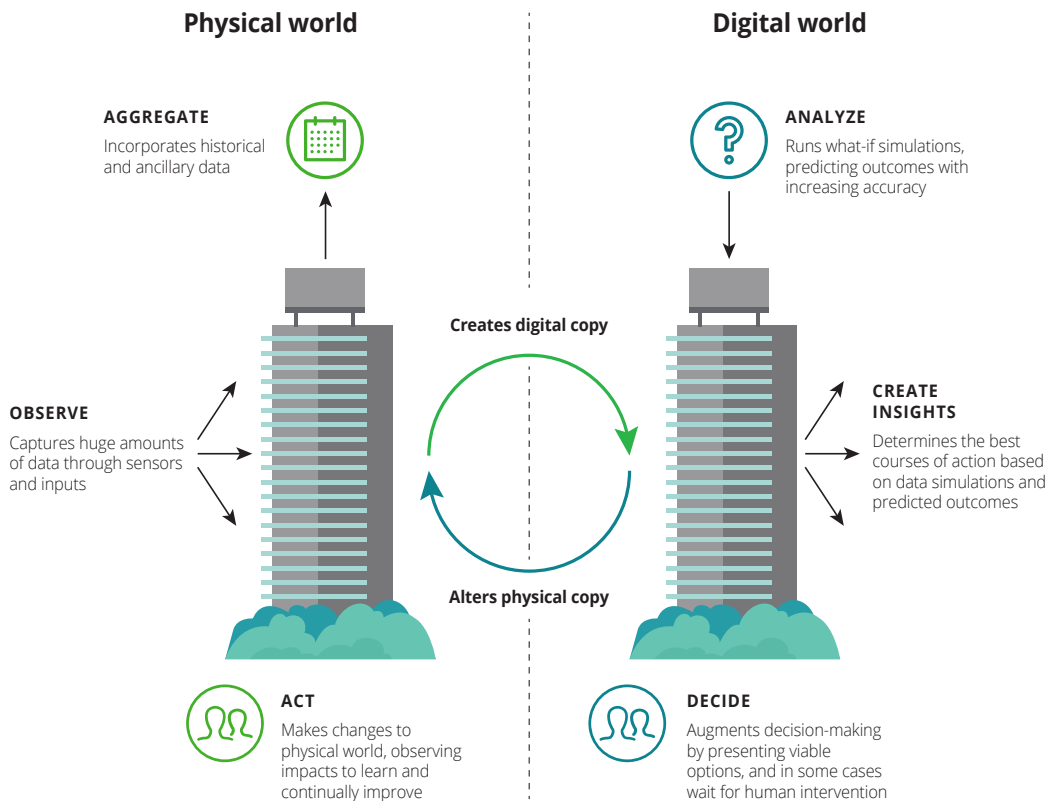
on factors such as heating, ventilation, and air conditioning (HVAC) systems, electricity, and water usage. This can help them take real-time action, as needed, in energy usage, emissions, and operational efficiency.

Digitalization and data-centricity also enable organizations to create digital twins of their buildings and run simulations, predict building performance, understand ways to achieve optimum performance, and inform their decisions to reduce their carbon footprint (see Figure 6). It's a virtual replica of the physical structure that provides real-time visibility of building performance, as well as a scenario-planning

engine to test the impact of change or disruption and optimize strategic planning and investment.

Many real estate technology service providers and suppliers are helping owners and operators to digitalize their buildings. One example is a Toronto-based company, specializing in end-to-end smart technology solutions for properties and portfolios, that connects all the building systems and data sources of a client, imports them into its cloud solution, and provides the client access to its data intelligence professionals. The parties then collaborate to optimize the building's performance.⁴⁵

Figure 6: Digital twins let companies test without real-world consequences



The future of sustainable real estate is smart

Adopt innovative business models based on the circular economy

To work on decarbonization targets while improving operational efficiency and minimizing upfront capital costs, owners and operators can adopt new business models. Examples include:

- **Product as a service:** This model allows owners and operators to monetize the structure, not just the space, and can include long-term lease and service contracts for key elements like building envelope and building equipment. They can adopt a **pay-per-use model and reward more efficient resource usage.** This way owners and operators can not only save on upfront and ownership costs, but also improve energy efficiency, cost savings, and emissions performance.
- **Adaptive reuse:** Owners and operators should focus on reusing and repurposing to extend the life of their properties through necessary retrofits instead of choosing demolition and new construction. **Adaptive reuse can return triple bottom-line benefits.** Financially, compared to new construction, it can be 16% cheaper and reduce build time by 18%.⁴⁶ Performing smart and sustainable retrofits while repurposing can enhance property performance and valuation as well. Socially, it can boost

the neighbourhood, generate local jobs, and preserve the cultural heritage. Environmentally, tonnes of embodied carbon can be reduced by choosing reuse over demolition.

An example of this in practice is in Montreal, where a real estate company specializes in adaptive repositioning and retrofitting of historically significant buildings. It has repurposed a historic textile industrial facility of 467,000 square feet into a flexible and dynamic business centre with 110 tenants and 97% occupancy.⁴⁷ In addition to custom-designed tenant improvements, the facility deploys a façade leasing model that helps to improve energy performance and reduce environmental impact.⁴⁸

Generate new revenue streams

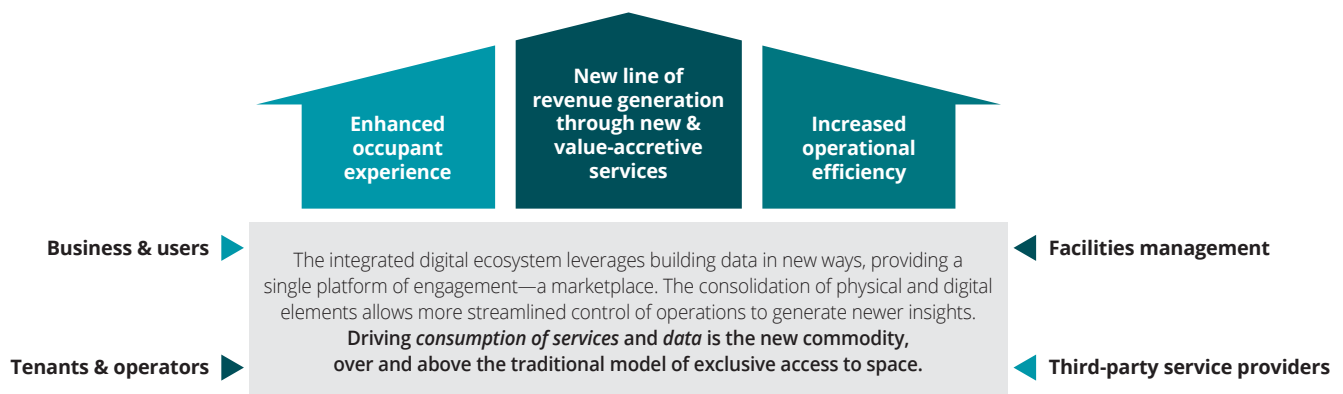
Owners, developers, and operators have an opportunity to create new revenue through smarter green buildings and an integrated digital ecosystem (see Figure 7).

- **Energy as a service:** With rising fossil-fuel energy costs and an increasing push for decarbonization, demand is going up for buildings powered by renewable energy. Real estate companies can invest in the on-site generation of renewable energy, including solar panels, battery storage, and microgrids. This can not only help improve energy management and lower

costs, but also provide energy as a service to tenants or relay it to the main grid.

- **Space as a service:** This model allows real estate companies to use collaborative and sharing models to increase asset utilization and boost net operating income. For example, one space-optimization company reported in 2019 that a traditional office was only 40% occupied at any given day on average, based on data collected across one million square feet of workspace.⁴⁹ By redesigning existing spaces to make them more dynamic and flexible, landlords can not only attract new tenants and increase space utilization during the day, but also during non-peak hours.
- **Sensing as a service:** Real estate companies can facilitate the creation of a shared network of sensors as a consumable service, thereby providing tenants with an opportunity to monetize the data using existing infrastructure and making more informed decisions around space and resource usage. They can also generate new service income by aggregating and sharing insights with tenants to make better decisions about their energy and water usage, waste management, and carbon footprint.

Figure 7: The benefits of an integrated digital ecosystem and newer data insights



Innovate for a sustainable future

The real estate industry is just starting to work toward decarbonization and net-zero goals, and changing policies remain a near-term risk. Owners, developers, and operators who are hesitating to act must understand that the pressure from their stakeholders is only going to increase, and that waiting will only lead to loss of value and an increased risk of obsolescence.

They should instead consider the opportunities that smarter green buildings provide to improve operational efficiency, boost revenue, and increase valuation and returns. As new technologies and business models emerge, real estate companies must

continue to reinvent themselves to capitalize on those innovations and realize triple bottom-line benefits across the economic, social, and environmental aspects.

We cannot solve tomorrow's problems with yesterday's thinking. Despite the preference to choose when we're ready to change, particularly as we deal with the pandemic's fallout on the industry, now is the time to adopt an innovative approach to drive profitability and carbon neutrality.



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