In collaboration with BCG

WORLD ECONOMIC FORUM

A Framework for the Future of Real Estate

INSIGHT REPORT

APRIL 2021

Cover: @astrakanimages via Envato Elements.

Contents

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Foreword

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This *Framework for the Future of Real Estate* is a work in progress, although not in the customary sense. For years now, many of us in the global real estate field have recognized the pressing need for change. By the time our group – the real estate industry CEOs, deputies and other collaborators of the World Economic Forum – set out to prepare a comprehensive report on the field's prospective future, we believed we understood the challenges ahead. A rapidly deteriorating environment, a frayed social fabric, rising inequality, problems of wellness and accessibility: all these required a concerted response from private-sector builders, designers and urban entrepreneurs. A year ago, we launched this endeavour with high hopes, beginning with a kick-off at the World Economic Forum Annual Meeting 2020 in Davos-Klosters and a rousing speech from Al Gore. The time, it seemed, was ripe for action. And then came the pandemic.

Everything in these pages – the charts and tables, the reams of statistics and scores of recommendations – was researched, written and assembled in the midst of an international calamity that, along with its attendant economic and social crises, served to drive home the urgency of our efforts. Over countless Zoom conversations and emails, we shared stories and ideas, attempting to distil from the whirl of events a few simple imperatives, a set of signposts that could help the industry find its way and fight back.

We resolved that our buildings and cities must be *liveable*, suitable habitats for a rich, culturally vibrant existence.

We resolved that they must be *sustainable*, optimized for zero carbon output in every aspect from construction to operations.

We resolved that they must be *resilient*, capable of adapting to whatever exigencies might arise, be it storms and floods or just changing patterns of working and living.

And we resolved that they must be *affordable*, with housing, transportation and essential services available to all.

These conclusions are supported by case studies from Boston to Shanghai, and explored through insights on everything from warehouse heating systems to the particulars of green building bond financing. It is our firm conviction, based on this evidence, that the vision advanced here is not only achievable, but presently within the reach of the real estate industry and its allied professions. Every day our work as chairmen has been bolstered by what we've witnessed on the ground in 2020, watching clients and business partners confront the gravity of the global situation and then realize, in a series of "ah hah" moments, the necessity for new thinking.

But this is the key point. For all its scope and detail, as well as the readily actionable items (regulatory, technical, organizational) that it identifies, this work cannot be considered finished until it has reached all of the policy-makers, elected officials and corporate leaders who are best positioned to bring its proposals to life. As per the title, *A Framework for the Future of Real Estate* is just that: a conceptual infrastructure onto which the whole apparatus of 21st-century development can be grafted, allowing it to flourish in a climate that – literally and figuratively – is changing at an alarming pace. The infrastructure, we are convinced, is sound; yet it must garner the attention and firm commitment of the industry at large in order to function as intended.

Seeing that it does so will be our task in 2021, and we look forward to pursuing it. We would like to thank everyone who laboured so diligently on this Framework for the Future of Real Estate through a most extraordinary and often very difficult year. Our work is at last complete. And now it begins.

Executive summary

This Framework for the Future of Real Estate provides a set of enablers, including accelerating digitalization and innovation to address everything from construction costs to the occupant experience.

The drastic impact of COVID-19 and the deepening of related crises inspired the World Economic Forum's global real estate CEO community to rethink real estate and align on a vision of buildings and cities that are liveable, sustainable, affordable and resilient. With leadership from these CEOs and input from their senior executives (deputies), this vision, along with a set of enablers and case studies, comprises this Framework report.

The Framework for the Future of Real Estate described in this Insight Report provides a set of enablers, including accelerating digitalization and innovation to address everything from construction costs to the occupant experience; upskilling and attracting workers with specific talent and knowledge of digitalization and sustainability; demonstrating clear, value-proof business cases for investment in technology, sustainability and affordable housing; engaging stakeholders, both across the industry value chain and with the local community; and ensuring regulatory frameworks that address supply challenges and sustainability goals and provide proper zoning and density.

This report also explores each major real estate asset class, and the overall urban landscape, through the lens of the vision and enablers. At the *city level*, the research and case studies demonstrate that mixed-use development with sufficient density can support sustainability and liveability, and provide a myriad of downstream effects, including shorter commute times, lower emissions and greater economic output and resilience. The unequal devastation of the pandemic and parallel economic and social challenges underscore the need for recovery efforts to prioritize affordability, liveability and inclusivity, and an increase in public-private cooperation to address their complexity.

At the *asset class level*, offices and homes must evolve to meet hybrid work models, and collaboration will be at the centre of office redesigns. Case studies clearly indicate that digitalization underpins transformation in every asset class and will be critical to meeting sustainability targets and fortifying against shocks. While affordable housing is more dependent on private financing than ever, even amid budget deficits, city-level government can play a key role in supporting supply through the provision of its own land and assets, along with strategic regulation to spur development.

Industrial and retail real estate have been upended by e-commerce, and both asset classes will require design features and improved digital capabilities to respond to shifting consumer behaviour. Hospitality and retail will increasingly rely on technology to create value for users through customization.

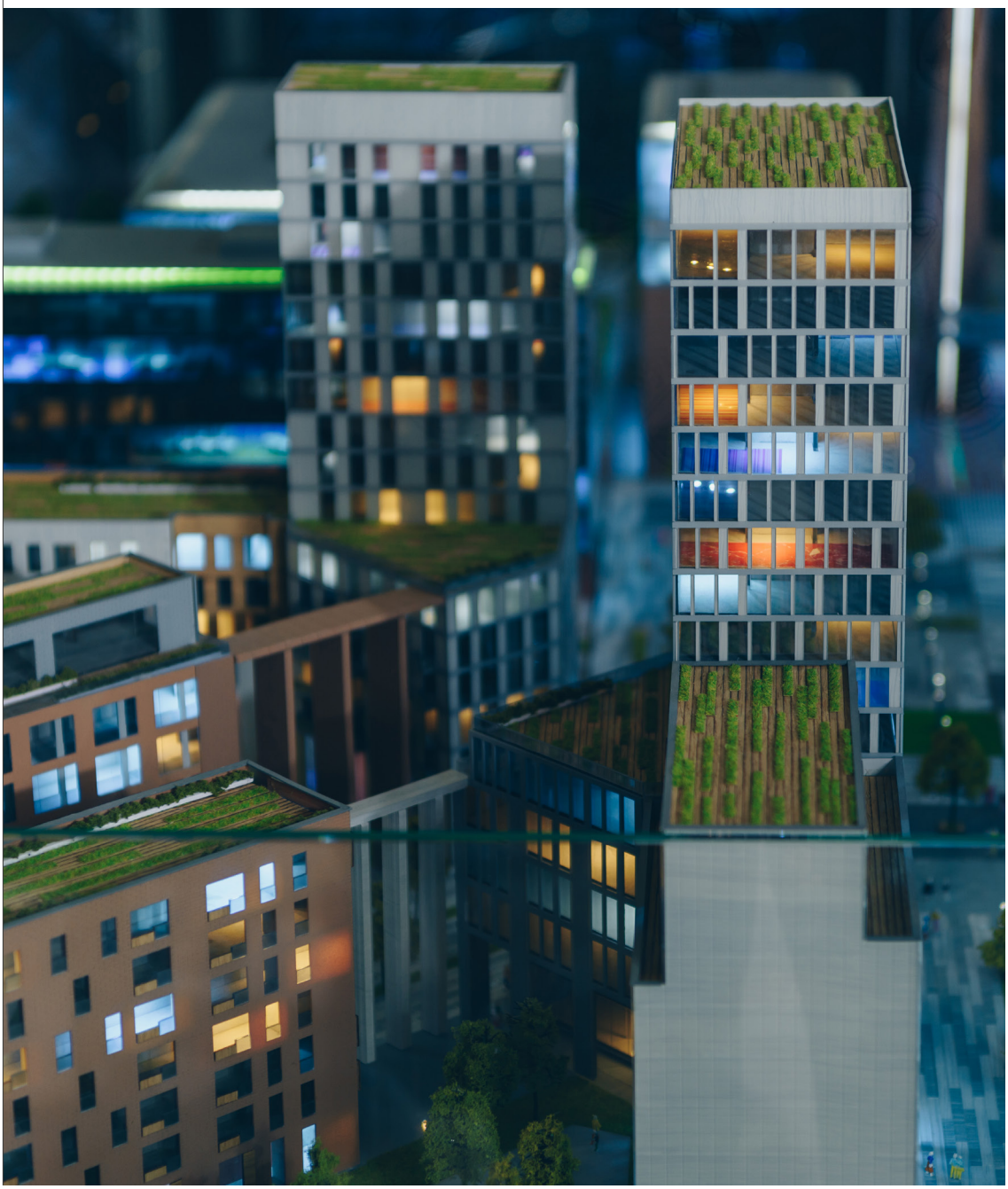
Changing demand drivers, accelerated by the pandemic, may render the excess supply of office, hospitality and retail obsolete, necessitating widespread renovations and the repurposing of assets, ultimately changing the composition of neighbourhoods. Case studies depict successful adaptive reuse with inclusion of sustainability and affordability goals.

This report also offers key actions for both the public and private sectors. *Private-sector actions* include embracing digitalization and hiring and training staff equipped with skills for the Fourth Industrial Revolution. Developing a clear business case for investment in technology is crucial to ensure goals related to hybrid work, sustainability and resilience are realized. The private sector can also play an instrumental role in helping the public sector craft legislation that is viable for business and will deliver on intended outcomes. Widespread commitment to environmental, social and governance issues, and to diversity and inclusion, is essential, along with improved transparency.

The *public-sector actions* highlight the need to commit to digitalization both in assets and in services, which means upskilling workers. Prioritizing renovation programmes as part of recovery efforts can help address challenges related to affordability, sustainability and resilience while creating quality jobs. To uphold the changing demand around certain asset classes, zoning for more mixed-use development, easier repurposing and sufficient density will help support neighbourhoods, address housing supply and offer wider community benefits, such as improved infrastructure and open space.

Below: @LightFieldStudios via Envato Elements.

1 Introduction



The urgent need to transform the real estate industry

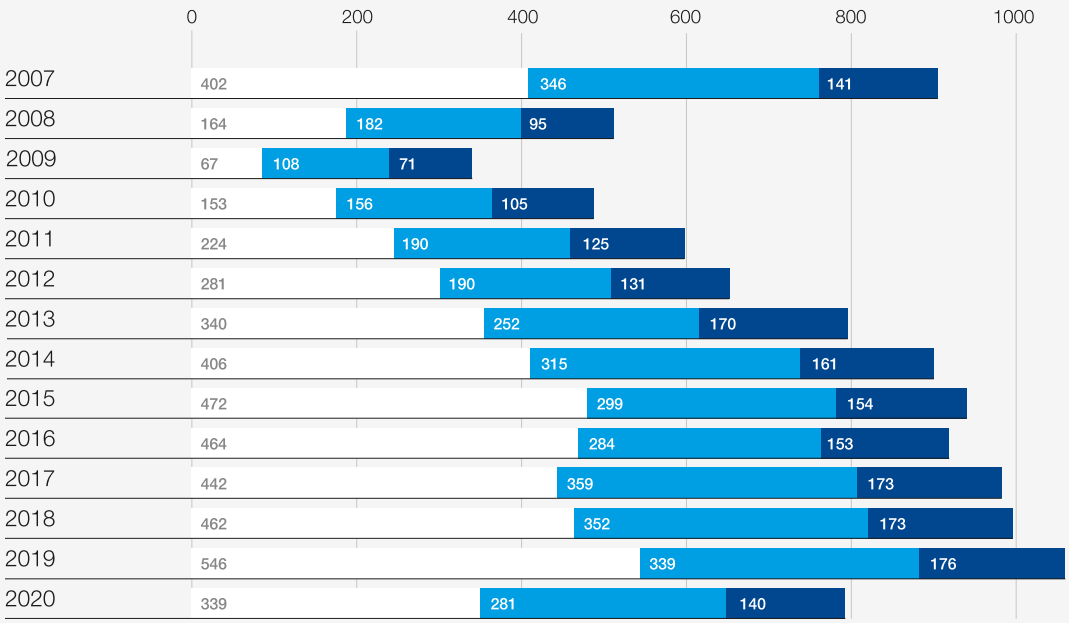
The year 2020 brought the convergence of multiple crises – public health, social, economic and planetary – to a crescendo and, with it, a reckoning for the real estate industry. The World Economic Forum Real Estate Industry community sees a unique opportunity and a clear mandate for the industry to transition to a future where buildings are **sustainable**, **resilient**, **liveable** and **affordable**.

The Framework for the Future of Real Estate provides a pathway to this transition, with a clear set of enablers and case study examples to help realize this vision.

The rise of real estate

Real estate is a major investment asset class that accounts for 10% of global GDP.[1] The past decade has been one of unprecedented growth in value (+3% compound annual growth rate)[2] and rising investment volumes (+14% compound annual growth rate)[3] as historic low interest rates, record "dry powder" (reserves) and the increasing securitization of real estate have driven significant investment. According to the real estate services company JLL, commercial real estate transaction volumes have steadily increased since 2009, hitting a record in 2019, with volumes greater than those in 2007 (Figure 1).[4]

FIGURE 1 **Direct commercial real estate transaction volumes, Americas, Europe, the Middle East and Africa (EMEA) and Asia-Pacific, 2007-2020**



Notes: Direct commercial real estate investment, deals over $5 million; includes office, multifamily residential, retail, hotels, industrial, mixed-use, healthcare and alternatives sectors; excludes entity-level and development transactions.

Source: JLL, *Global Real Estate Perspective*, February 2021.

While investors became increasingly cautious in 2019, the asset class remained highly liquid with a stable spread relative to senior sovereign debt and solid returns, proving its resilience and stability. The growth of real estate, however, has come with several significant challenges, including fragmented regulatory frameworks, high carbon emissions, a severe dearth of affordable housing, slow technology adoption, a lack of transparency and inadequate resilience.

Above: @EverydayAmazing via Twenty20.

The ill effects of COVID-19

COVID-19 has halted much of the industry's growth and sent some asset classes into a tailspin. The pandemic has accelerated certain trends to a fever pitch and affected many of the underlying demand drivers of the real estate industry. While some of these impacts are temporary, others are expected to be more permanent, transforming the future of certain asset classes and posing unique challenges to recovery.

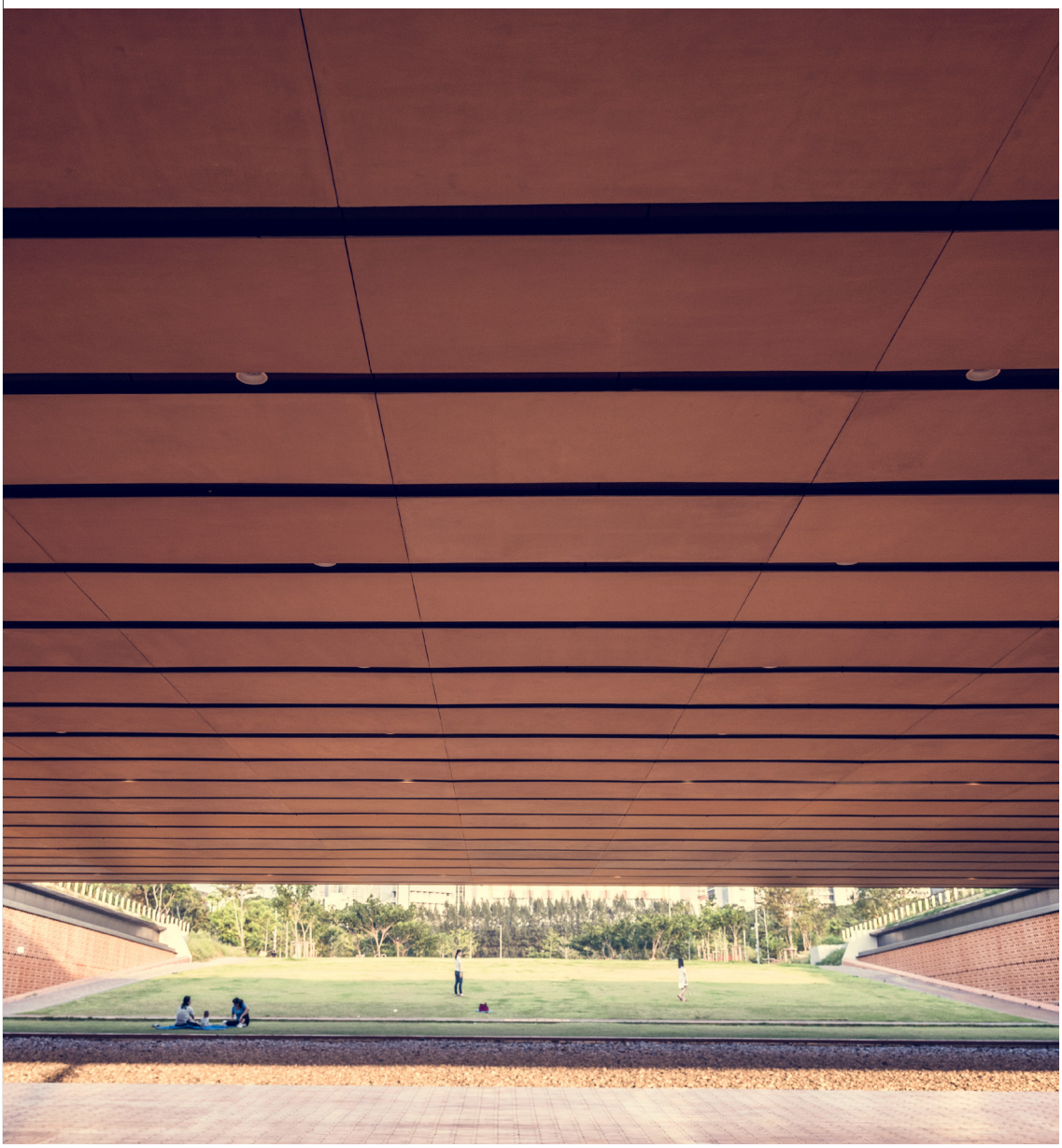
> **The world will look different in the coming years; our cities and urban centres especially so. COVID-19 will hasten many of those changes, but the overriding trends and forces for change were already well established before this horrible disease gripped the world. Much about the way we live and work will be transformed. For most, hopefully, it will be an improvement and lead to more fulfilling and rewarding lives and careers.**
>
> Christian Ulbrich, Global Chief Executive Officer and President, JLL, USA. Excerpt from "Why global cities will flourish in a post-COVID future"

The real estate industry's need to transform

To thrive, the real estate industry needs to transform. Buildings and cities are vital to societies and economies. They are the vehicles through which people live their lives: they bring people together, provide respite, shelter and inclusion, drive businesses, support or damage health, and nurture creativity. The imperative for better buildings is clear and the industry is mobilizing in response.

Below: @Rawpixel via Envato Elements.

2 The Framework for the Future of Real Estate

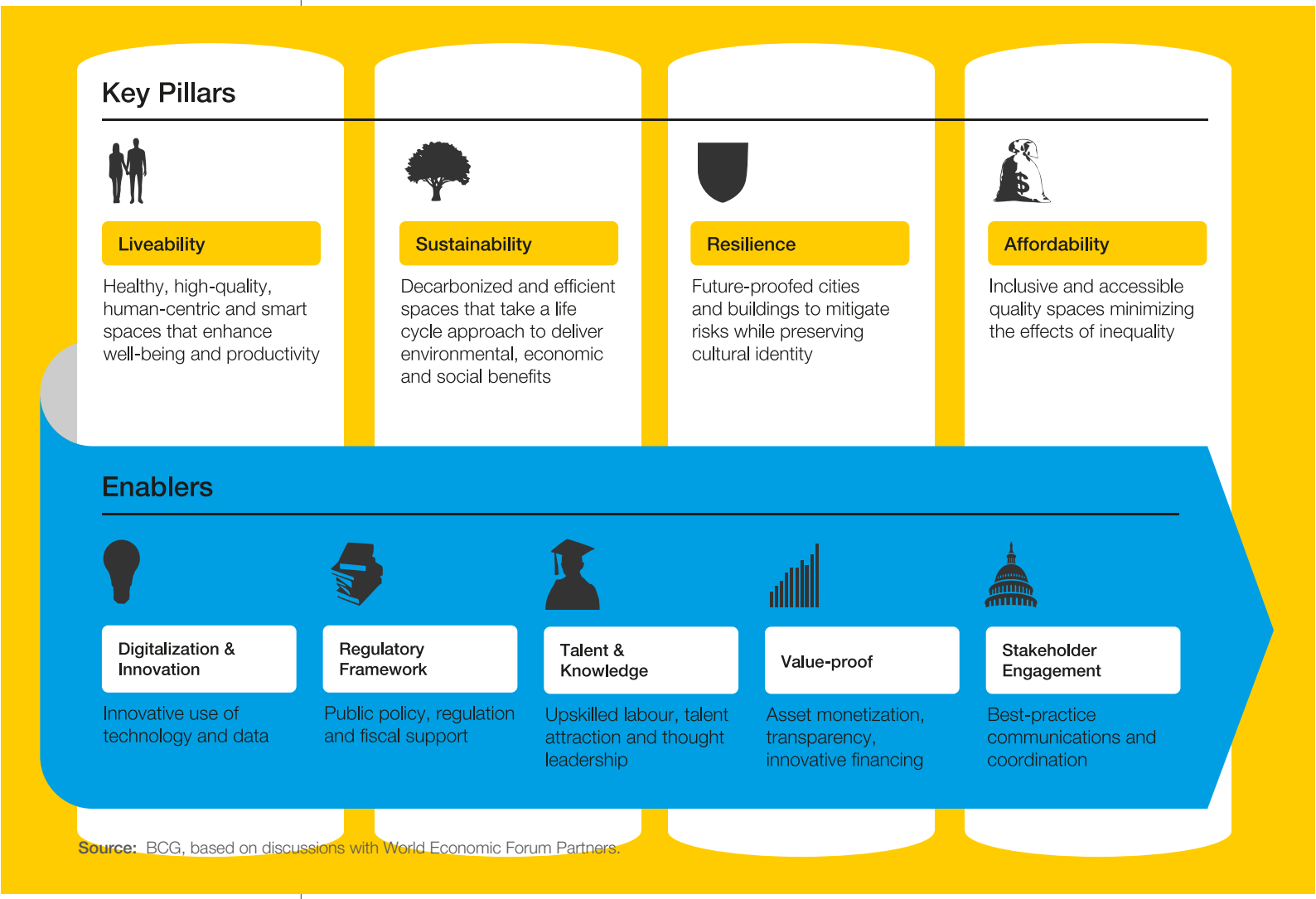


The World Economic Forum's Real Estate CEOs have developed a vision for the future of real estate. It is a future in which buildings provide comfort, are equipped for the most unprecedented events, support human and planetary health, and are affordable and accessible for all of society. It is a vision in which the real estate of the future is **liveable**, **sustainable**, **resilient** and **affordable**. To deliver on this vision, this Framework for the Future of Real Estate was created to provide a pathway for the industry to transition, drawing upon best practices and business solutions from successful case studies provided by World Economic Forum Partners around the world.

Four key pillars

The future vision of cities and buildings is based on four pillars: liveability, sustainability, resilience and affordability. It identifies key enablers to chart the course for change. The future vision of real estate is illustrated in Figure 2.

FIGURE 2 **Framework for the Future of Real Estate**



Source: BCG, based on discussions with World Economic Forum Partners.

Liveability

A combination of factors contributes to a good quality of life, including well-developed buildings and communities, human-centric and inclusive designs (designed for people of all ages and abilities), and social, community and recreational facilities that meet the needs of citizens in tandem with real estate development. Liveability encompasses the interactions between spaces and occupants to ultimately enhance the human experience. People spend about 90% of their day indoors,[5] which makes buildings instrumental in ensuring liveability. Research has shown the positive correlation between a comfortable environment and productivity.[6]

Places are essential for life. When we vacated many places due to the pandemic, we also lost the experiences that go with those places. … Our experiences are enabled by a vast array of places to work, live and play effectively, while providing inspiration, connection and discovery. Real estate is the stage on which life is lived, and its value can be maximized if it is designed to enhance those experiences. The recovery is an opportunity to realign real estate value with human experience.

Diane Hoskins, Co-Chief Executive Officer, Gensler, USA. Excerpts from "Real estate must offer human experiences, as we escape virtual lockdown living"

Sustainability

Buildings account for nearly 40% of global greenhouse gas emissions.[7] By 2030, the current building stock will make up 80% of the built environment in developed countries, and only a tiny proportion of buildings – about 1-2% – is currently renovated in any given year.[8] To meet net zero carbon goals, which requires abating the carbon emitted throughout the full asset life cycle (e.g. building development, operation and decommissioning), action must be accelerated. This will require energy retrofits of old buildings, which are costly but could help cut energy demand for heating by two-thirds or more and would reduce or eliminate CO_2 emissions by switching to renewables or decarbonized electricity. It will also require the renovation or repurposing of buildings rather than demolition. The Royal Institute of Chartered Surveyors (RICS) has calculated that "35% of the life cycle carbon from a typical office building is emitted before the building is even opened"; that number for a residential building is 51%.[9] This suggests it takes decades to pay back carbon debt, despite the emissions savings being created in the new building.

Resilience

At the heart of building resilience is future-proofing cities and buildings and the humans that occupy them, by mitigating the effects of unforeseen natural and man-made events, such as climate, financial and health crises, and preserving the cultural identity of communities. Assets need to withstand a variety of unpredictable shocks and be flexible to adapt to changing consumer demand throughout their full life cycle.

Affordability

Providing both individuals and companies with fair access to quality space to live and conduct business is essential to the overall health of society. The cost of space, as well as location, can prohibit people from meeting other basic living costs, threatening their employment and fundamental human rights. Affordability must comprise both financial access and appropriate asset standards:

- "Financial access": access to affordable rents, or fair down payment requirements and mortgage rates as well as reasonable operating expenses (e.g. tax, insurance, repairs)
- "Appropriate asset standards": sufficient spaces and healthy conditions as well as convenient locations with fair access to basic services (e.g. education, public transit, healthcare).

Enablers

Delivering buildings that embrace the four pillars will require the following key enablers.

Digitalization and innovation

Technology and digital solutions will be among the most critical enablers to usher in the new era of real estate, allowing not only the customization of spaces according to occupant needs (e.g. temperature, humidity) but also taking building operations to the next level and addressing sustainability and affordability:

- Data-driven and autonomous buildings: Autonomous buildings continuously learn, adapt and respond to the needs of people and the environment. Exploiting a continuous feedback loop of rich data made available by the buildings' digital infrastructure provides lessons about how buildings' spaces, places and services are being consumed to continuously improve products and design decisions for the benefit of people. Autonomous buildings auto-tune, adapting to dynamic indoor and outdoor conditions, create optimal working conditions for improved productivity, empower people to work effectively and collaboratively, and make people healthier.
- Interconnected buildings: An interconnected system of buildings can operate together to create efficiencies (e.g. a supply–demand energy balance).
- Construction costs: Innovative design and construction techniques along with more advanced materials can help lower upfront development and retrofit costs, supporting the affordability agenda.
- Cybersecurity and privacy: Data ownership and use regulations will be critical in the next decade. Privacy and security must be top priorities in the digitalization process to ensure occupants and owners are protected.

> **It's widely recognized that the real estate industry needs to change its practices. Our productivity has fallen by 19% during the past 50 years, while the average productivity of all other industries has increased by 153%. Our inability to lock in productivity gains has occurred at the same time demand for our services is increasing exponentially ... According to a recent study, a 1% reduction in construction costs would save society about $100 billion annually. ... digital twins can help us achieve cost savings of up to 20% and a hundredfold improvement in speed to market on new projects, creating significant social, economic and sustainability benefits.**
>
> William Ruh, Chief Executive Officer, Digital, Lendlease Group, Australia. Excerpts from "How digital twins will troubleshoot - and even help design - the buildings of the future"

Talent and knowledge

The future of real estate requires extensive and up-to-date knowledge and competences as well as a leading talent pool with broad market expertise and knowledge. This means upskilling existing employees and focusing on attracting talent. The industry should also establish the right corporate structure at the C-suite level and appoint leaders with capabilities to head the transformation. For example, by having a Chief Technology Officer, Chief Data Officer, Chief Sustainability Officer or Chief Resilience Officer, companies can better ensure that goals related to sustainability, resilience and technology are met. It is also critical for real estate businesses to actively work to create diversity and inclusion in their workplaces and ensure more equal representation in terms of age, gender, ethnicity, religion, disability, sexual orientation, education and national origin.

Value-proof business case

New solutions are only scalable when there is a compelling business case and clear return on investment. Every solution proposed throughout this Framework is feasible and scalable, but the lack of alignment of interests among stakeholders often inhibits deployment. Creating comprehensive metrics that reward all stakeholders throughout the value chain will foster investments and unlock the needed transformation. Increased transparency is also needed. A transparent real estate market can be defined as "one in which stakeholders have ready access to high-quality market data and performance benchmarks; where there is certainty, consistency and where rigorously enforced rules and regulations exist".[10]

> **Historically, investments in sustainability have always been regarded through a narrow return-on-investment lens – an approach that could be even more challenging in the current context. However, that thinking has evolved over the years as global investors, pension funds and financial institutions are demanding that their investee companies incorporate, track and report ESG [environmental, social and governance] performance into the risk-adjusted returns that they deliver.**
>
> Ahmed Galal Ismail, Chief Executive Officer, Majid Al Futtaim Properties, United Arab Emirates. Excerpt from "Here's why the business of sustainability has come of age"

Stakeholder engagement

The real estate community (policy-makers, lenders, investors, tenants, contractors, etc.) must actively collaborate to develop more effective solutions to industry challenges. For example, conversations with policy-makers would highlight industry needs and concerns, and vice versa, to ensure policy is capable of implementation. Partnerships with tenants, operators and asset managers to define cost-sharing mechanisms would encourage the implementation of new solutions that improve operations while reducing costs.

Meaningful collaborations with academia and civil society are also fundamental. Cooperation with academia can enable businesses to understand the latest research, innovation and technology, which can be incorporated into developments. Collaboration with civil society ensures that citizen needs are fully understood, resulting in human-centric developments that encounter fewer obstacles during the urban planning process. Engagement with the community is also essential as the rise of local resident opposition to projects, often referred to as NIMBYism, an acronym for "Not in My Back Yard", can jeopardize successful completion.

> **The essence of stakeholder engagement is to get varied and wide perspectives so you can come up with better solutions or ideas. For instance, engaging with environmentalists and biologists from Hong Kong University has helped to develop urban gardens that boost biodiversity. Likewise, the support of local authorities has been vital to develop attractive designs and detailed plans that support the wider communities that we serve.**
>
> Guy Bradley, Chief Executive, Swire Properties, Hong Kong SAR. Quote provided to the World Economic Forum

Regulatory framework

Endorsing flexible zoning and city development plans will support progress, as will standardizing existing, fragmented building codes. Standards must become more unified at every level – from city to city and from country to country. Regulation can also be a tool to push change, such as in the case of net zero carbon targets; their mandatory nature can be a powerful instrument and complement corporate responsibility goals, or affordability, in which the regulation can incentivize and subsidize supply and/or demand to help close market gaps.

Framework development

The development of this Framework for the Future of Real Estate is based on a collection of insights from industry leaders and on best-in-class case studies from around the world provided by members of the World Economic Forum Real Estate Industry community.[11]

Below: @Golero via Gettyimages.

3

The Framework: An asset class view

This section describes the Framework pillars and enablers relative to the primary real estate asset classes and the city level.

3.1 Cities and urban development

> **Urbanization has delivered huge scale and network benefits, and helped us to address a range of shared challenges. … COVID-19 has not changed the long-term trend towards urbanization ... Four principles that can form the blueprint for a cleaner, greener and more inclusive built environment are:**
>
> **1. Redefining value for social good.**
>
> **2. Standards as a vehicle for responsible growth.**
>
> **3. Diverse user and community needs at the heart of projects.**
>
> **4. Realizing the transformative power of technology and data.**

Sean Tompkins, Chief Executive Officer, Royal Institute of Chartered Surveyors (RICS), United Kingdom. Summarized from "4 priorities for a better built environment in the post-COVID city"

Cities will continue to thrive in a post-COVID-19 world, but they must adapt

Cities are home to more than half of the world's population (~55%)[12] and generate approximately 80% of global GDP.[13] COVID-19 has hit them hard, however, as illustrated in Figure 3. In cities, cases per million people have doubled the global average and GDP is expected to decrease by about 1.5 times in 2020 with respect to the world average.[14]

Below: @21aerials via Envato Elements.

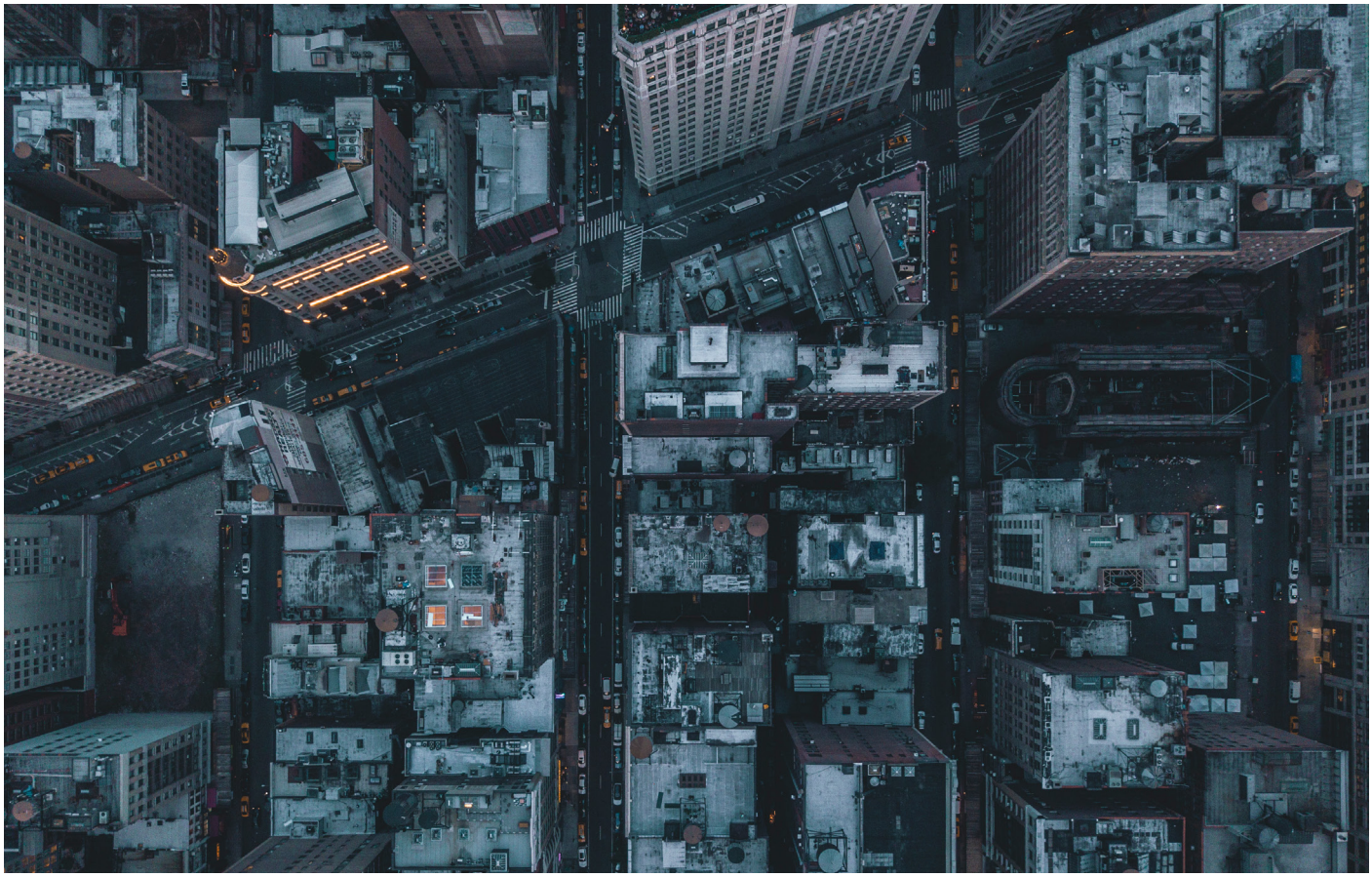
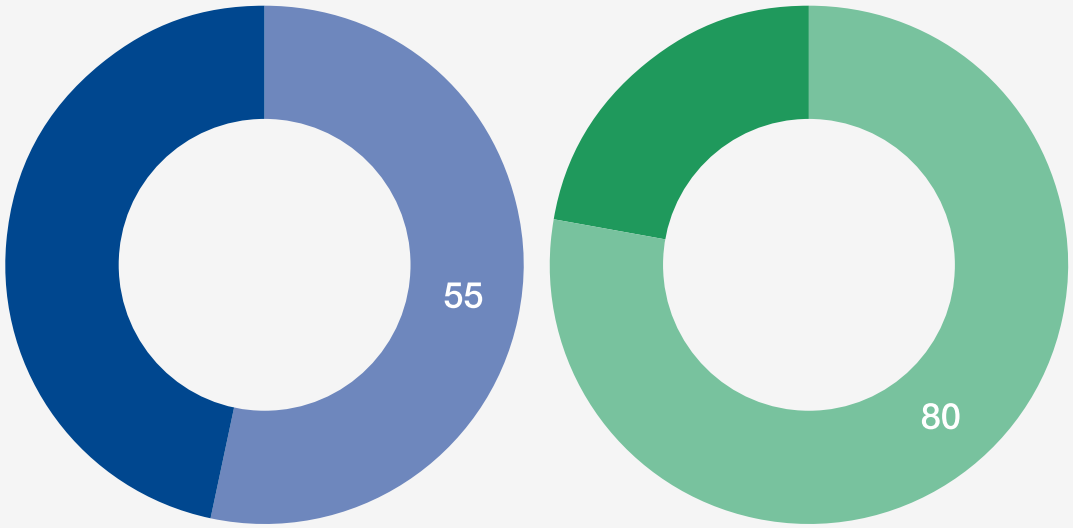


FIGURE 3 | **Cities' economic magnitude and COVID-19 impact**

Cities are critical to the global economy as they are home to the world's population
Importance of cities (2020 data)



% of the global population lives in cities
% of global GDP is generated by cities

As of 15 October 2020

Total impact on capital cities of the top 30 countries (by GDP)

2x cases per million in cities vs world average
1.5x higher GDP loss % expected in cities vs the world in 2020

As of 15 October 2020

Notes: 1. Capital cities: Washington DC, Beijing, Tokyo, Berlin, Delhi, London, Paris, Rome, Brasilia, Ottawa, Moscow, Seoul, Madrid, Canberra, Mexico, Jakarta, Amsterdam, Riyadh, Ankara, Bern, Warsaw, Taipei, Stockholm, Brussels, Bangkok, Buenos Aires, Abuja, Tehran, Vienna, Abu Dhabi; 2. As of 15 October 2020, cases per million in Top 30 capital cities (data not available for Taipei, Ankara) of ~12,000 vs ~6,000 cases per million world average; 3. Average GDP loss of ~6% in Top 30 capital cities vs ~4% in the world expected for 2020; Top 30 cities (data not available for Brasilia, Canberra, Bern) expect a fall in GDP by ~$308 billion while the world expects a fall in GDP by $3.6 trillion.

Sources: BCG analysis based on official regional databases; Oxford Economics; World Bank.

City revenues are expected to plunge around 15-25%, according to the World Bank,[15] due to reduced use of public transit and less income from property and sales taxes. City expenses are also on the rise because of an increase in the demand for health and sanitation services and the need to feed vulnerable citizens. Tightened city budgets resulting from the pandemic could be a significant barrier to transformation, highlighting the necessity to effectively leverage private financing.

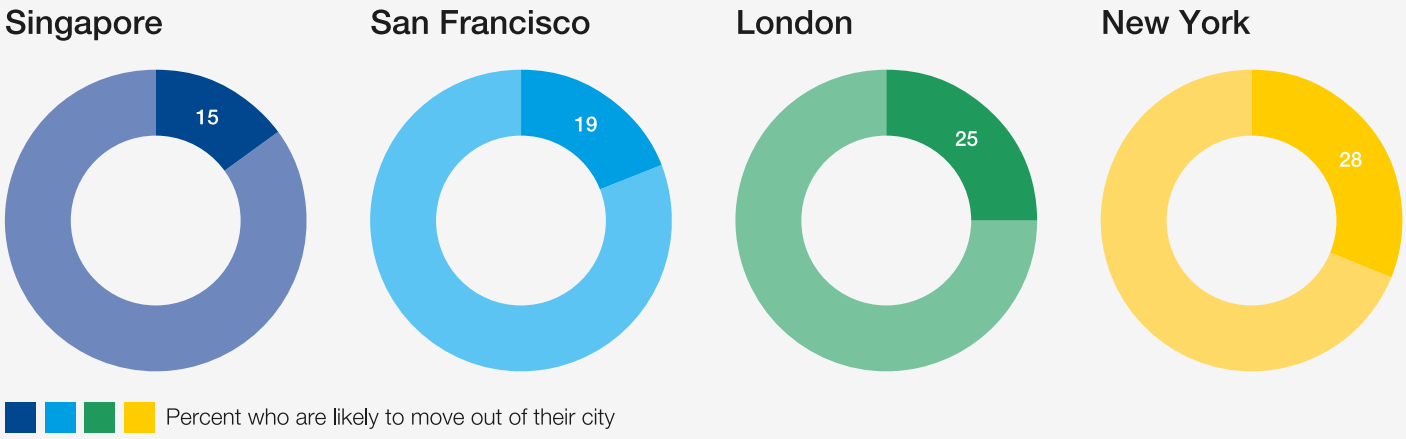
The impact of the pandemic has also been unequal. Privileged communities have fared far better than low-income communities, which have experienced the most devastation.

The possibility of working remotely in suburban, rural or less expensive cities may stall the rapid growth that major global cities have been experiencing over the past few decades, with an urban population increase of more than 40% since 2000.[16]

Amid the uncertainty that COVID-19 has generated for the future of cities, the Gensler Research Institute conducted a global survey in four major urban centres worldwide – New York, San Francisco, London and Singapore – to study residents' reactions to the pandemic and sense their willingness to stay in cities.[17] As illustrated in Figure 4, the conclusions, uniform across regions, revealed that city growth may experience a slowdown as 15-30% of respondents indicated they are likely to move out of their cities. While uncertainty still exists, however, fewer than 30% of respondents indicated they will move.

FIGURE 4 **Likeliness of urbanites to relocate due to COVID-19**

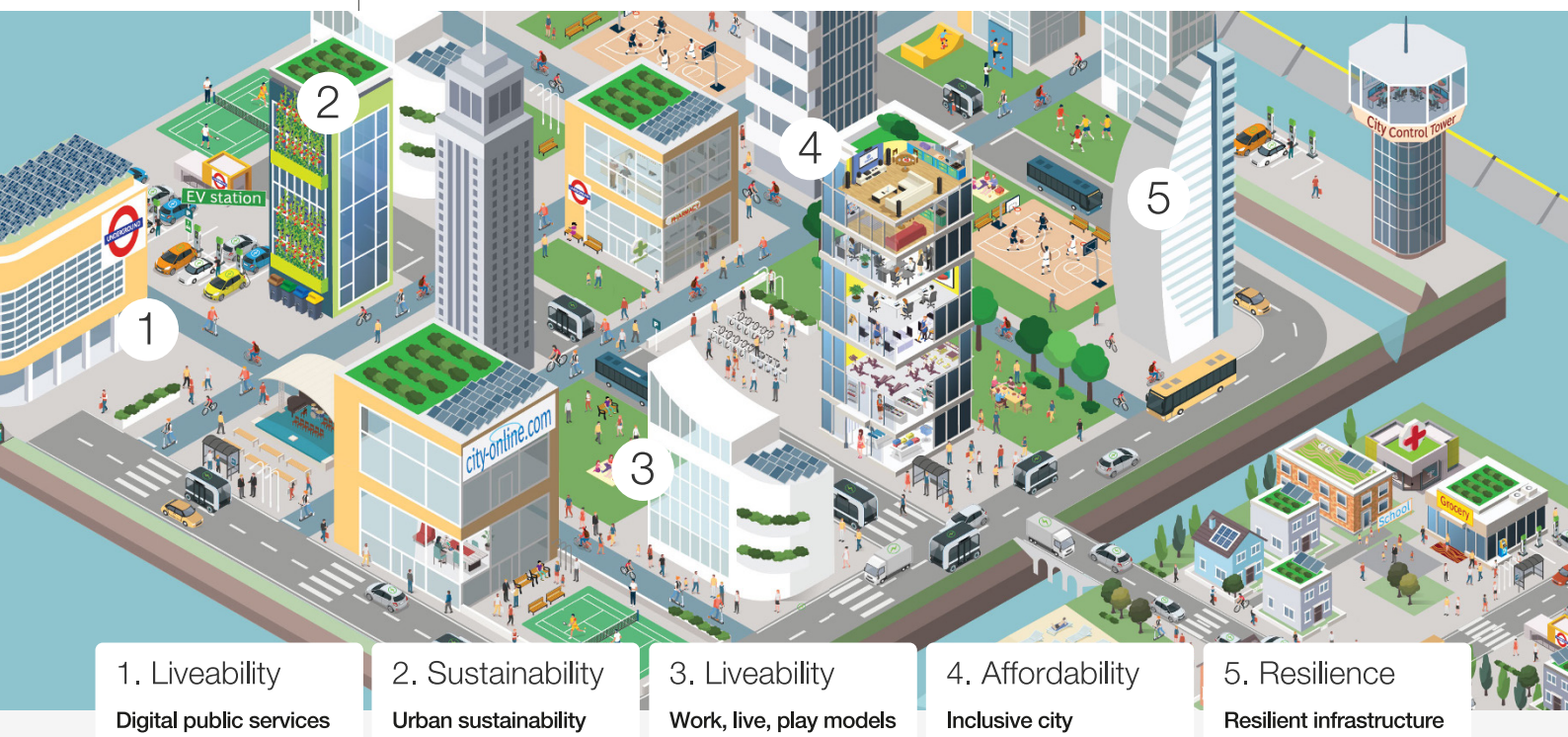
Less than 30% of urban residents are likely to move out of their cities.



Source: Based on Gensler, City Pulse Survey, 2020, https://www.gensler.com/research-insight/gensler-research-institute/city-pulse-survey-2020 (accessed 2 March 2021).

While cities are far from the demise that salacious news headlines predict, they must confront series challenges pertaining to climate change and inequality, and ultimately transform.

FIGURE 5 **A city of the future: local, smart, sustainable and amenity-driven**



1. Liveability
Digital public services

City services **online**, with enhanced cybersecurity

Real-time data for **transparent** decision-making

2. Sustainability
Urban sustainability

Green mobility & public transport

Open **green spaces** & vertical farms

Net zero carbon ecosystem: sustainable built environment, renewable energy source integration, circular business models, etc.

3. Liveability
Work, live, play models

Local communities embracing mixed-use real estate and agile infrastructure

Burgeoning local economy with key services nearby

Increased outdoor focus with space for leisure activities near office and residential areas

4. Affordability
Inclusive city

Increased **affordable housing**

Equitable access to key services: healthcare, digital, etc.

5. Resilience
Resilient infrastructure & operations

Climate-smart infrastructure: resilient to extreme weather changes

Real-time data tracking & surveillance of city operations

Source: BCG analysis.

To transform, cities must address the components of the Framework for the Future of Real Estate, working to address liveability, sustainability, resilience and affordability in urban planning, as illustrated in Figure 5, and ultimately transform into:

1. **Liveability:** Convenient, local and compact communities that facilitate comfort and well-being
2. **Sustainability**: Green and sustainable ecosystems that result in carbon neutrality
3. **Resilience**: Comprehensive preparedness against a variety of future shocks
4. **Affordability**: Inclusive urban environments where citizens have equal access to services and infrastructure.

Underpinning this transformation will be digitalization. Public services should embrace an outcomes-focused model that will deliver for citizens and enable the city to operate in a more efficient manner. This will require migration to seamless, secure digital channels where all information – health, tax, etc. – is collected under the same profile and transactions can be performed on a single platform.

1. Liveability: Convenient, local and compact communities that facilitate comfort and well-being

Live, work, play models, for instance locally-oriented projects that foster community building and improve liveability, offering a variety of amenities nearby such as work, healthcare, leisure and basic supplies, etc., can transform the way people interact with their cities, enhancing the urban experience, providing convenience and re-establishing social connections within the community. They are also effective in revitalizing distressed and underdeveloped areas.

CASE STUDY

The Hub at Causeway, Boston, USA

Gensler developed the Hub at Causeway in Boston, a high-density transit-oriented mixed-use revitalization project built around an existing rail hub that has driven economic activity for the entire surrounding area. The Hub is LEED (Leadership in Energy and Environmental Design) certified and includes advanced design-driven efficiency measures, such as glass that regulates heat and balconies that support airflow. The area had been neglected and was a food desert, requiring extensive infrastructure upgrades. The development has created permanent jobs, alleviated food access issues by including the city's largest supermarket and increased property values in the neighbourhood.

Sources: Gensler and World Economic Forum.

In addition, cities need to provide balanced, sustainable communities that are dense and compact, which support climate goals and better enable the delivery of infrastructure and services. Contrary to the belief that has emerged during the COVID-19 outbreak, a study conducted by US university scholars Hamidi, Sabouri and Ewing concluded that urban density is unrelated to infection rates and inversely related to mortality rates.[18] It is essential that density and crowding are not conflated, as the latter is in fact what drives contagion.

CASE STUDY | **Taikoo Place, Hong Kong SAR**

Swire's Taikoo Place is a business hub with nine interconnected office towers located in Hong Kong SAR. Taikoo Place has transformed the area from a neglected industrial complex with dockyards and a sugar refinery into an interconnected office hub with a strong focus on sustainability. Swire leveraged the allowed density to deliver 6 million total square feet, reviving the zone that evolved into one of the city's most distinctive urban areas. Stakeholder engagement was key to successful completion, as was engagement with local authorities, tenants, transportation authorities and local citizens.

Sources: Swire Properties and World Economic Forum.

The economic benefits of a compact and connected city are significant. Connected cities tend to be more productive and innovative. In fact,10% higher urban population density is linked to a 1.1% increase in patents per 1,000 people and a 1.9% increase in gross value added, according to a study from the Coalition for Urban Transitions.[19] Higher density can also reduce the overall carbon footprint of citizens with efficient energy and land use, which also results in improved air quality.[20] The heat loss in distribution networks is 20-30% in single family homes and 5-10% in higher density neighbourhoods.[21]

Australia and France are also redesigning neighbourhoods to better provide communities with equitable access to services. The "20-minute neighbourhood" in Melbourne and the "15-minute city" in Paris are hyperlocal concepts where all amenities and services, such as education, health, basic supplies, etc., are within a short distance from home, fostering local interactions and supporting small businesses. Melbourne has consistently been ranked the most liveable city in the world; Figure 6 depicts the 20-minute neighbourhood concept developed as part of the long-term strategy of the Victorian Government in Australia.

FIGURE 6 | **Melbourne's 20-minute neighbourhood concept**

Features of a 20-minute neighbourhood

- Local shopping centre
- Local health facilities & services
- Local schools
- Lifelong learning opportunities
- Local playgrounds and parks
- Green streets and spaces
- Community gardens
- Sport and recreation facilities
- Safe streets and spaces
- Affordable housing options
- Ability to age in place
- Housing diversity
- Walkability
- Safe cycling networks
- Local public transport
- Well connected to public transport
- Jobs and services within the region
- Local employment opportunities

Source: Based on State Government of Victoria, Planning, "20-minute neighbourhoods", 2018, https://www.planning.vic.gov.au/policy-and-strategy/planning-for-melbourne/plan-melbourne/20-minute-neighbourhoods (accessed 1 March 2021).

2. Sustainability: Green and sustainable ecosystems that result in carbon neutrality

Cities consume two-thirds of the world's energy and account for more than 70% of global CO_2 emissions.[22] Yet, not all sectors have an equal impact on the environment. Transportation, buildings, infrastructure and construction represent more than 50% of total emissions[23] and will be the areas where action will have the greatest impact.

As described further in the World Economic Forum Insight Report *Net Zero Carbon Cities: An Integrated Approach*, reaching emissions targets requires the integration of smart energy infrastructure, ultra-efficient buildings and clean electrification. In addition, cities and industry need to leverage the circular economy, clean mobility and nature-positive solutions to deliver on climate commitments:

Circularity: Circularity needs to be adopted in business-as-usual operations, for instance, by purchasing local supplies and reusing raw materials. Construction in particular could reuse materials (e.g. structural elements) from demolished buildings to reduce the material intake in new buildings, ultimately lowering overall lifetime emissions associated with embodied carbon.

Clean mobility solutions paired with reduced travel demand: In addition to planned regulation banning gasoline-powered cars from entering central business districts, community-oriented neighbourhood designs can discourage car use, reduce the need to travel and encourage cleaner transportation modes such as bikes or e-scooters.

Nature-positive solutions to address sustainability in cities: Prioritizing green space can help increase carbon capture while improving overall liveability. For example, London has released its 2025 plan, which includes places that can be adapted for different uses depending on the time of the day, day of the week or time of the year, such as outdoor gyms, skateboarding parks and pop-up art galleries.[24]

CASE STUDY

Tianfu Greenway, Chengdu, China

The Tianfu Greenway project, led by Chengdu Xingcheng, is turning a third of usable land in Chengdu into green spaces. Tianfu Greenway will expand city wide and comprise one axis, two mountains, three rings and seven paths. The project will create a connection of parks and waterways, and will accelerate the integration of fragmented ecological areas to create a relatively complete green space ecosystem. Ultimately, the project intends to build a smart and sustainable city and economic hub. Preserving and prioritizing publicly accessible outdoor space are essential and can help facilitate cultural exhibitions, community gatherings and physical activity.

Sources: Chengdu Xingcheng Investment Group and World Economic Forum.

3. Resilience: Comprehensive preparedness against a variety of future shocks

Potential crises facing cities range from severe weather to public health and economic shocks, and cities must fortify themselves across the risk spectrum.

COVID-19 revealed lapses in preparedness and the insufficient infrastructure that exacerbated the crisis. In relation to climate hazards, 76% of cities worldwide remain gravely exposed to climate change risks.[25] For example, flooding will have caused property damage worth $136 billion in the United States by 2045, forcing 280,000 Americans to adapt or relocate.[26] As demonstrated by severe wildfires in Australia and the western United States in 2020, these hazards are not simply future threats but imminent problems.

By monitoring and assessing risks, cities can minimize the impact of natural disasters, and digital solutions will play a key role in this challenge. For example, in Viet Nam, the city of Da Nang implemented a virtual zone dashboard to assess the impact and damage of potential typhoons on the region's housing and infrastructure.[27] Likewise, the city of Antwerp in Belgium developed a thermal mapping and warning system to predict and prepare for heat waves.[28]

4. Affordability: Inclusive urban environments where citizens have equal access to services and infrastructure

The World Economic Forum *Making Affordable Housing a Reality in Cities* report emphasizes that collaborative frameworks between cities and private institutions need to be further established to develop a viable solution that addresses the affordable housing problem structurally.[29]

Inclusivity also means creating spaces for communities to collaborate with the public sector and have resident-to-resident cooperation, which could help stop the rise of NIMBYism and issues of inequality.

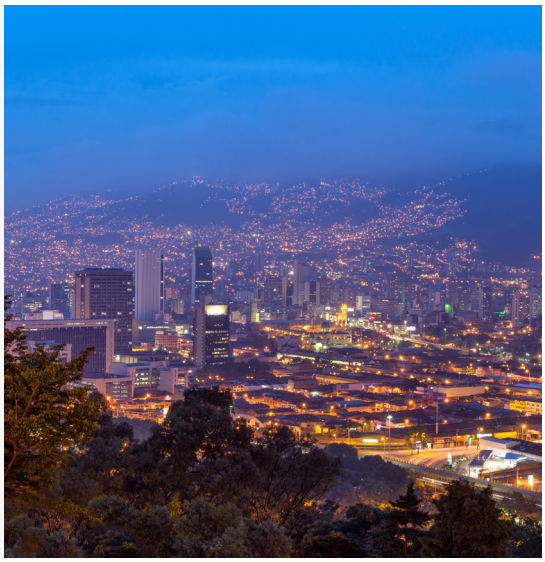
Transformation needs to be driven both by private and public actions and increased collaboration to develop effective policy.

CASE STUDY

City transformation, Medellín, Colombia

Source: Coalition for Urban Transitions, *Climate Emergency, Urban Opportunity*, 2019.

In 1991, the Government of Colombia required all city-level governments to create development plans and supported them fiscally with redevelopment efforts. A Presidential Council created in Medellín brought together the public sector with business, academia and community organizations to address poverty and violence, which created Programa Integral de Mejoramiento de Barrios Subnormales en Medellín (PRIMED). PRIMED provided 2,100 households with legal tenure, renovated 3,500 houses, developed and improved critical infrastructure and supported 70% of the neighbourhoods, many of which were informal settlements. The result has been a complete transformation of the city, which is now safer, prosperous and more equitable.

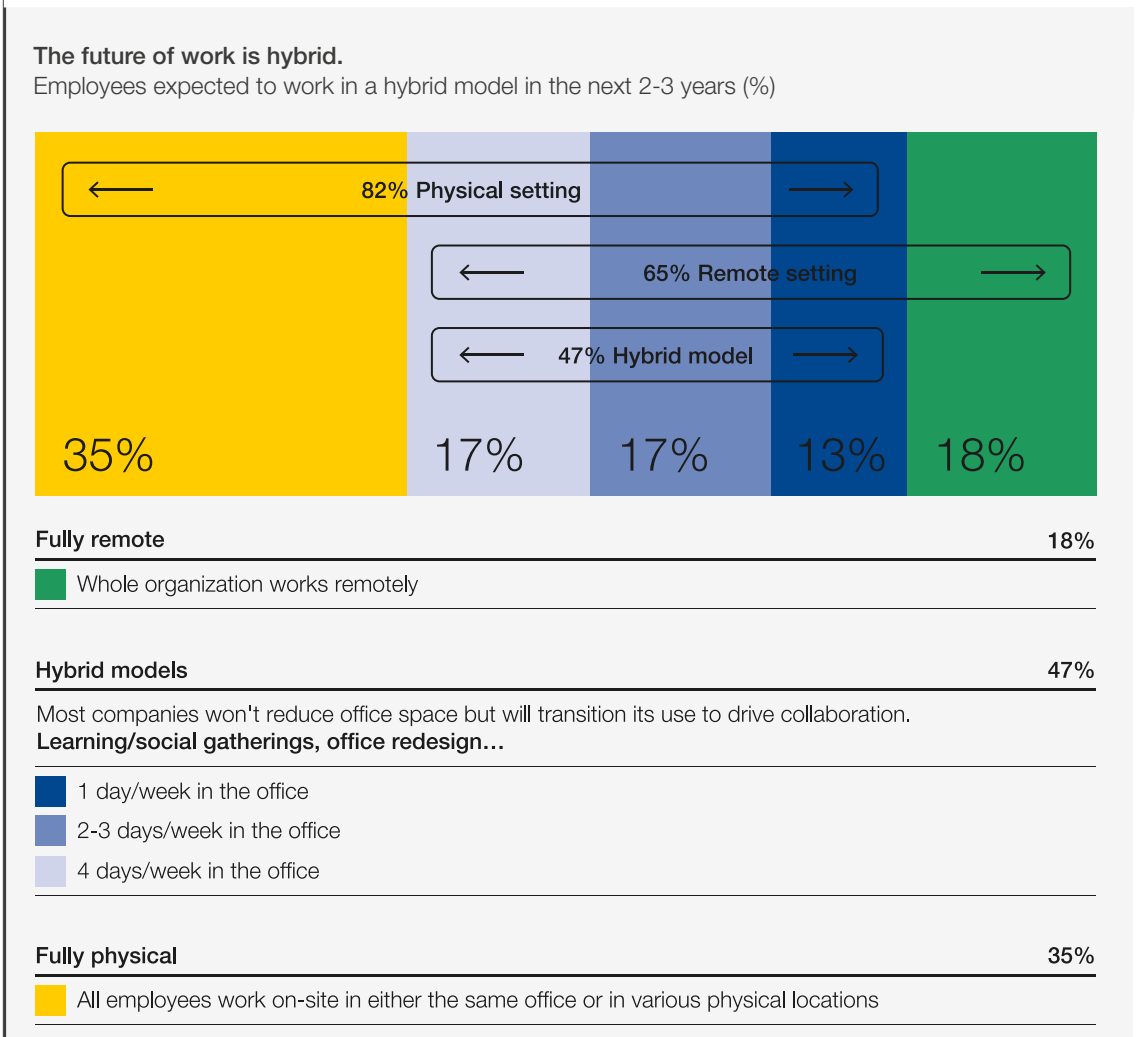


Below: @Pilar Olivares via Reuters.

3.2 Office

COVID-19-induced remote work has raised questions around the future of the office; however, there is broad consensus that the office will continue to play a key role for companies across regions, but that spaces must evolve to meet the demands of a future in which hybrid work models will likely reign. BCG surveyed 100 managers and 500 employees across Europe, with results (Figure 7) that indicate that 65% of the workforce will want to work remotely, at least partially, post-COVID-19. Only 18% of respondents wanted to work fully remotely.

FIGURE 7 **Forecast of employees' working habits**



Sources: Survey conducted by BCG of 100 managers and 500 employees in Europe, with support from KRC Research; Ferreira, José, Pablo Claver, Pedro Pereira and Sebastião Thomaz, *Remote Working and the Platform of the Future*, BCG, October 2020, https://web-assets.bcg.com/80/8db524dc4b80abf09f0575cd0eea/bcg-remote-working-and-the-platform-of-the-future-oct-2020.pdf (accessed 4 March 2021).

The office of the future

Fully remote work highlights the importance of physical interaction with colleagues in driving innovation and developing teams. Carlo Ratti, Director, SENSEable City Lab, MIT, does not believe that offices will be – or should be – made obsolete. Data from his research both before and during the pandemic reveals that people lose the benefits of unplanned interactions in a totally virtual setting as the flow of ideas and social relationships decrease.[30]

> **Offices provide the 'three Cs' – colleagues, culture and collaboration – that are highly valued. For employees, the office provides a place for face-to-face interactions that technology struggles to replicate, such as social interaction, mentoring and managing. … For employers, physical spaces showcase a company's brand and culture and play a key feature in attracting and retaining the best talent.**
>
> John Moran, Chief Executive Officer, JLL, Ireland. Summarized from "Despite COVID-19, the end of the office is far from nigh"

The office will remain key for talent attraction, as seen by the increase in premium office leasing prior to the pandemic. In London, contracts for Class A (prime) offices from 2017 to 2019 almost equalled those for Class B and Class C together (48% for Class A vs 52% for Class B and C).[31] Prior to the pandemic, the densification of office spaces was on the rise with space per employee having decreased by 8% from 2010 to 2017 in the United States.[32] While those trends were driven primarily by cost savings, both tenants and developers are more imminently rethinking design to accommodate for increased productivity, collaboration and occupant health. Technology will be a cross-cutting theme, underpinning the evolution of the modern office as stakeholders across the commercial office value chain, including tenants, will look to technology to improve all aspects of office operations.

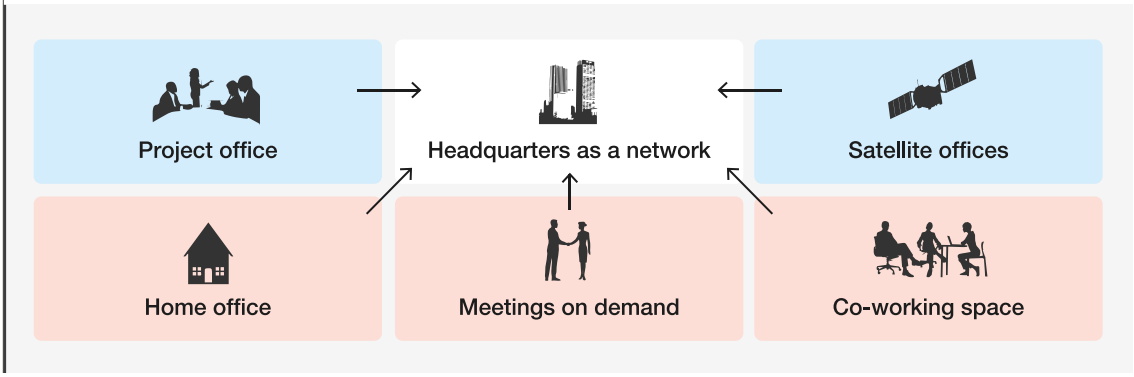
Traditional office designs with only desks for individual work and a smattering of conference rooms will offer very limited benefits for the future of work and will need to adapt in order to strengthen the key value propositions around:

1. **Liveability**: Accommodating hybrid working models that enhance employee experience and bolster productivity as well as innovation
2. **Sustainability**: Working towards net zero carbon goals
3. **Resilience**: Becoming more flexible to accommodate fluctuating and evolving demand
4. **Affordability**: Delivering reduced life cycle operational costs.

1. Liveability: Accommodating hybrid working models

According to the previously presented survey carried out by BCG on working habits, the future of work will likely be hybrid, since almost half of the workforce (i.e. 47%) are keen to have flexibility. Offices will coexist with remote work options and will be integrated into a hybrid model that provides options to employees, combining the benefits of remote work and physical locations, as illustrated in Figure 8.

FIGURE 8 **Headquarters-as-a-network model**



Source: BCG

In this new hybrid model, office space must evolve from a place to sit at a desk to a space to connect and share ideas, using design to enhance the employee experience. Technology will be a key lever to ensure employee connectivity across all physical locations, and cybersecurity will be required to ensure safe connections across a distributed workforce.

Activity-based workplace: Dynamic and collaborative layouts

Office layouts should be dynamic and maximize the value of in-person contact, while accommodating a variety of uses throughout the day. An activity-based workplace provides a plethora of different environments to support people during their workday. From focus zones to work cafes, the space integrates "external" elements such as co-working and the home office.

FIGURE 9 **Activity-based workplace**

1
Neighbourhood work zone
Workstations and phone rooms available for individuals and team activities

2
Focus zone
Quiet areas to support focused, heads-down time

3
Collaboration zone
Well-equipped areas for group work, digital connections and formal meetings

4
Work cafe
A blend of social spaces with productivity enablers to promote a casual work setting

5
Wellness zones
Relaxation rooms to support health

6
Third place
A semi-social environment for "alone, together" time

7
Home office
An ergonomically supportive home office with limited distractions

Source: Khandelwal, Bharat, et al., "Work Will Never Be the Same – Savvy Business Leaders Are Adapting to Change that's Already Here", BCG, 17 November 2020.

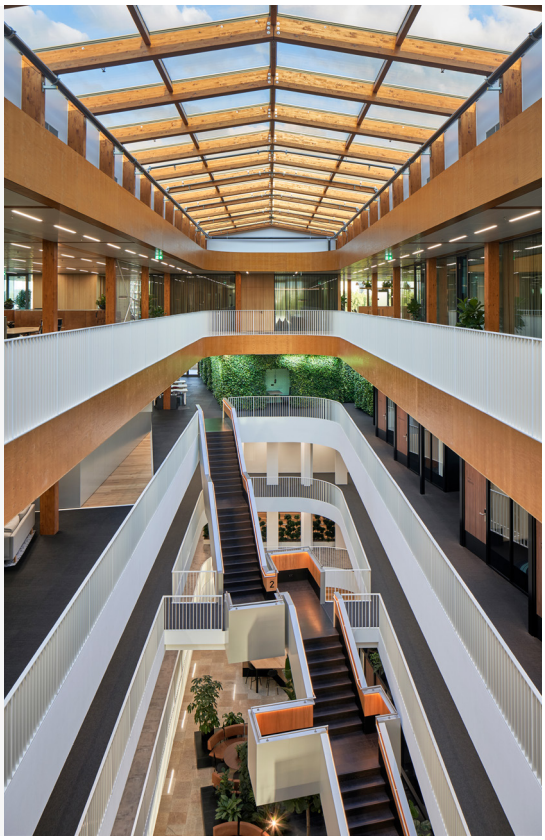
Beyond cultivating collaboration, other design features can support employee well-being, such as meditation rooms or adjustable lighting and temperature. Digital solutions can also keep employees updated on air quality and other building metrics, which provides more visibility and control over individual environments, boosting overall liveability.

CASE STUDY

EDGE Olympic, Amsterdam, Netherlands

The EDGE Olympic building in Amsterdam is a modern office concept centred on liveability and employee well-being. It takes into consideration:

- Sustainability: The building is a circular redevelopment with minimal additions of new materials, consumes minimal energy – 72 kWh/m^2, as compared to typical non-residential buildings that consume 223 kWh/m^2 – and is energy neutral on a city level.
- Employee comfort: Different user-oriented environments are designed to cover all employee needs – co-working areas, studios, innovation labs, cafeterias, silent rooms, a green terrace – increasing employee engagement and productivity.
- Technology: The building also has flexible digital infrastructure that connects everything and everyone to a single cloud platform – EDGE Next – that makes it possible to customize the environment (e.g. lighting, temperature, humidity, ventilation and air quality, noise), locate colleagues and find available working or meeting rooms.



Sources: EDGE Technologies and World Economic Forum.

CASE STUDY

One Museum, Shanghai, China

The One Museum Place project in Shanghai focuses on employee well-being and sustainability. The building features a state-of-the-art air filtration and handling system, broad outdoor terraces overlooking green spaces, and retail that provides a variety of food and beverage options for daytime and evening leisure. It was designed to integrate with the Jing'an district and to connect to the transportation network. It is LEED Platinum and RESET certified. Multiple stakeholders were engaged throughout the process, including local government, transportation authorities and citizens.

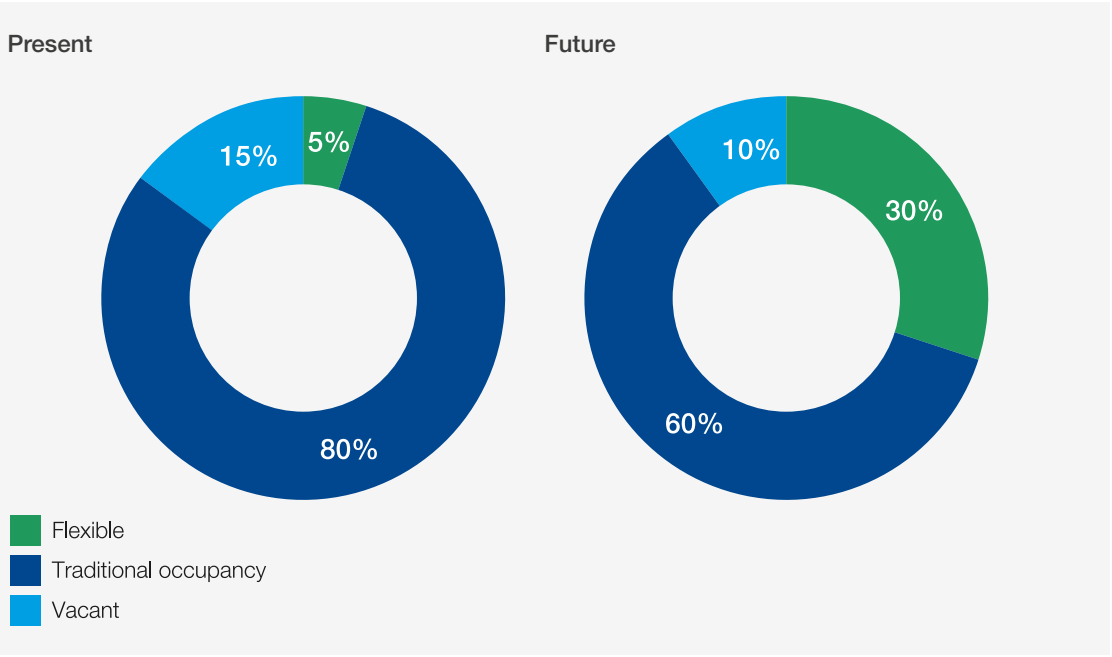
Sources: Gensler and World Economic Forum.

Co-working: A rising trend that is here to stay

Co-working is a solution to enhance the liveability of post-COVID office life. It is poised to grow stronger with the adoption of hybrid working models, as shown in Figure 9. Co-working space offers agile designs, technology integration and, most importantly, flexibility. Locations are generally more convenient than the traditional office locations in central business districts. For tenants, flexibility means adjusting space needs quickly, as opposed to traditional, longer-term leases. In the last 10 years, co-working has grown significantly across geographies,[33] but it still represents less than 5% of the total market to date.[34]

While COVID-19 temporarily stalled growth, once the threat of the virus subsides, large companies (with their hybrid working models), small and medium-sized enterprises and start-ups will boost demand again. According to research conducted by JLL, presented in Figure 10, flexible spaces could reach a 30% market share, becoming an important sector for asset managers and investors.[35]

FIGURE 10 | **Breakdown of future office market share**



Source: JLL, "Coworking's unstoppable market growth", https://www.us.jll.com/en/coworking-market-growth (accessed 2 March 2021).

As the hybrid model spreads and companies begin to adopt flexible arrangements, office buildings that do not adapt or are simply a victim of oversupply may remain vacant and fall into distress.

2. Sustainability: Working towards net zero carbon goals

Prior to the pandemic, a number of businesses, organizations and cities made ambitious pledges to mitigate the climate impact of the built environment. The Net Zero Carbon Buildings Commitment, developed by the World Green Building Council, asks signatories to achieve net zero carbon emissions in all assets under the signatories' direct control.

In addition to stimulus packages aiming at a green recovery, lockdowns and disruption to business-as-usual operations have prompted corporations to reinforce their commitment to carbon reduction. In June 2020, the Brazilian cosmetics giant Natura launched its "Commitment to Life" vision for the next 10 years, pledging to achieve net zero emissions. Unilever also announced a $1 billion investment in a climate and nature fund and pledged to reach net zero emissions across its products by 2039.[36]

The office asset class is at the forefront of sustainability and could become the industry's R&D lab for innovative low-carbon solutions

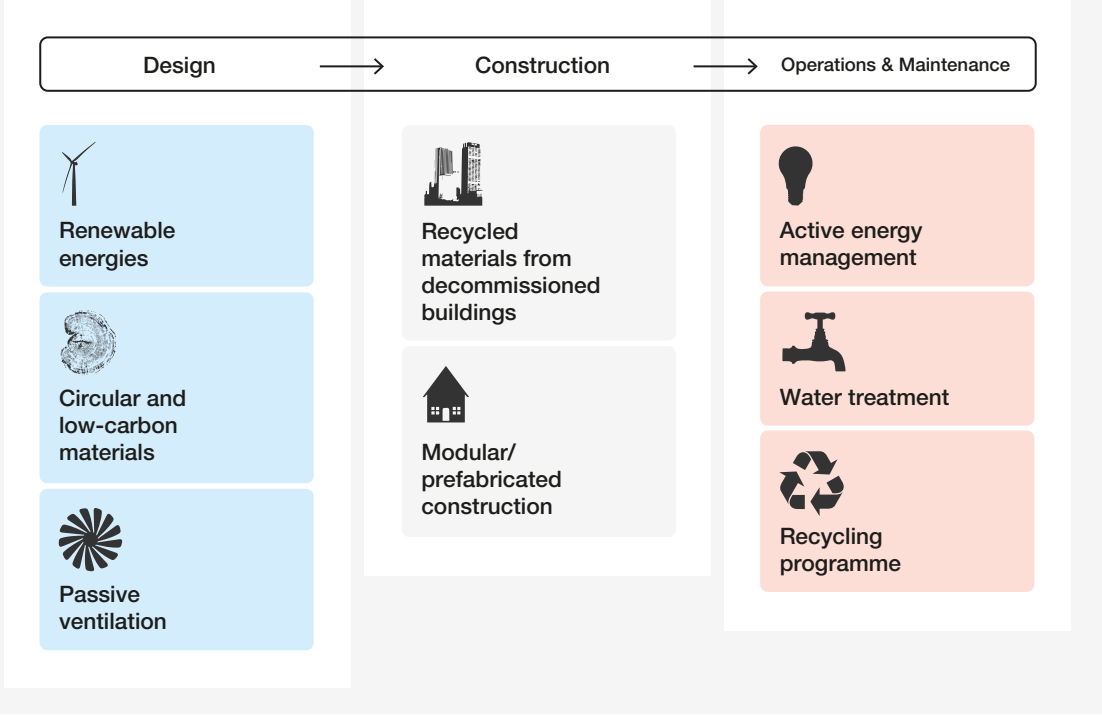
Based on the number of Silver, Gold or Platinum LEED-certified buildings, offices (over 18,000) and residential developments (over 21,000) are the leading asset classes in sustainability. However, the total area of commercial office is more than 100 times that of residential developments.[37]

Given the scale of office developments and the strong willingness of tenants to commit to sustainability, offices can become the innovation lab for the industry to not only incorporate current best practices but also to test new solutions at scale and then translate them to other asset classes.

As shown in Figure 11, numerous solutions exist, driven by digitalization, with proven value that can be incorporated to address decarbonization.

FIGURE 11 | **Selected features with a high impact on sustainability**

Measures can be undertaken on all steps of the project life cycle.



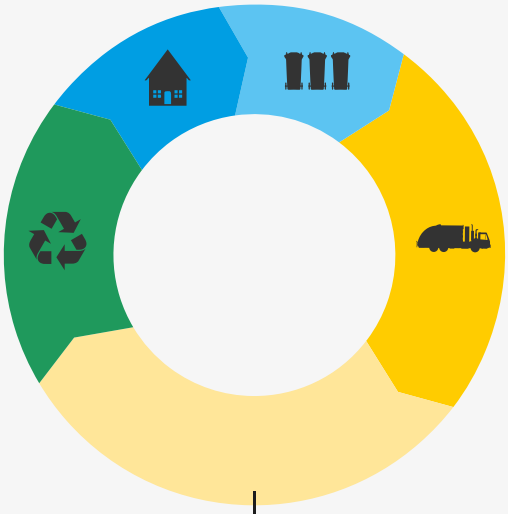
Source: World Economic Forum Real Estate Industry Partners.

Below: @twenty20photos via Envato Elements.

A selection of these solutions are showcased by best-in-class case studies.

CASE STUDY

RMZ recycling, Bangalore, India



Cement kiln
Non-recyclable low-value plastic sent to cement kilns

Compost
Biomethanized at a KSPCB-approved plant from food waste and wet waste

RMZ's holistic recycling programme is an end-to-end waste management system that enhances circularity in building operations. Its pillars are resource recovery (e.g. reuse) and waste segregation at the source. To prevent waste from reaching landfills, it is profiled, treated and converted into alternative resources:

- Non-recyclable low-value plastic is sent to cement kilns and the remaining reject waste is sent to a landfill.
- Wet and food waste is composted on-site and then biomethanized at a Karnataka State Pollution Control Board (KSPCB)-approved plant.
- Paper and other plastic waste is recycled into stationery products while non-recyclable parts are sent to co-processing.

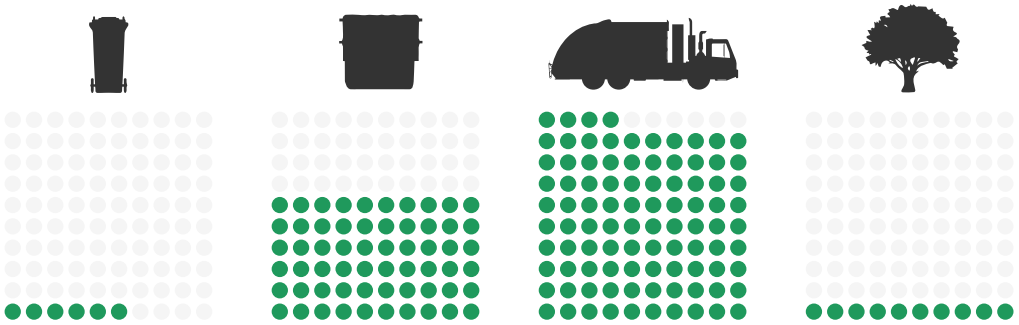
Source
Segregated waste: Waste is segregated through a 3-bin system
Collection: Segregated waste is collected by an external vendor
Secondary sorting: Bin-to-bin system of wet waste collection
Recycled products: From paper & plastic waste as well as dry waste

Technology and stakeholder engagement were crucial for project delivery and to achieve such success:

- Constant and rigorous engagement with tenants to provide training and transmit project impact as well as a sense of urgency are necessary to ensure buy-in and collaboration.
- Technology improves waste monitoring through internet of things (IoT) sensors and optimizes segregation and recovery by capturing and analysing data.

The results of the programme have been outstanding, with tangible impact.

The results of holistic waste management at RMZ



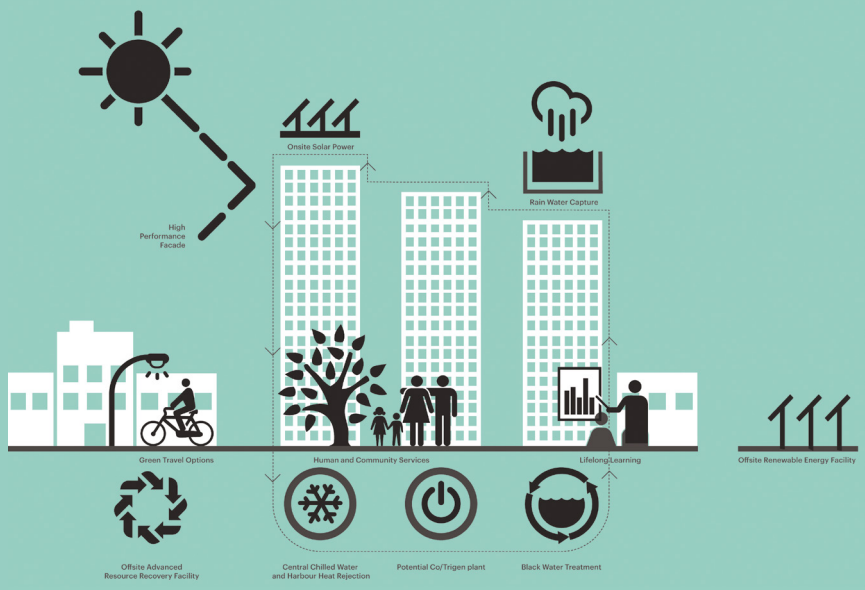
Reject waste in 2015
6%

Reject waste in 2018
60%

Waste recovery rate
94%

10 Buildings with zero waste

Sources: RMZ, BCG and World Economic Forum.



Source: Based on Barangaroo, "Sustainability", 2017, https://www.barangaroo.com/the-project/progress/sustainability (accessed 6 April 2021).

Barangaroo is a carbon-neutral mixed-use development with commercial offices that is designed to be water positive and produce zero waste emissions, enabled by centralized, precinct-wide infrastructure, including Sydney Harbour water cooling, embedded electricity networks, recycled water treatment plants and on-site renewable energy generation.

- The plant, services and systems for nine buildings are designed as "one system", housed in a 77,000 square-metre basement that is almost as large as one of the 42-storey office towers that sits above it. It provides the 20,000 workers in Barangaroo offices, as well as apartment occupants and retail shoppers with power, waste management, cooling, heating and water.
- Barangaroo will be capable of recycling more water than it consumes, saving approximately 40 Olympic-sized swimming pools of water every year. Innovatively, the cooling plant uses Sydney Harbour water instead of drinking water for heat rejection.
- The central waste management plant has diverted over 5,400 tonnes of waste from landfills in its first three years of operation. Many of the tenants have embraced sustainability initiatives, including reducing single-use plastics.

Sources: Lendlease and World Economic Forum.

1	Bidirectional charging points to allow car-building energy flows	2	Solar photovoltaic panels to supply energy for the building and electric cars	3	Building information modelling (BIM) material passports
4	Demountable wood construction	5	Heat and cold storage	6	Rainwater collection for use in building and rooftop gardens

The building's concept takes into consideration:

- **Sustainable materials:** The building is constructed mainly with timber, which has lower embodied carbon than traditional construction materials such as cement and steel, while giving the space a more natural feel to enhance well-being.
- **Circularity**: The reutilization of building materials is enabled by a building information modelling (BIM)-based material passport, which allows the tracking and monitoring of every single resource deployed in the development.
- **Renewable energy**: The building also draws from renewable sources through 3,000 square metres of solar panels, a solar charging point for 120 electric cars, which allows energy to flow bidirectionally, smoothing the building's demand curve, and through heat and cold storage, contributing to energy neutrality.

Sources: EDGE Technologies and World Economic Forum.

3. Resilience: Becoming more flexible to accommodate fluctuating and evolving demand

During the last decade, the market has shifted to favouring high-quality office space. Class A offices have outperformed other classes and new developments have primarily been geared to the highest end of the market. In Bangkok, the occupancy rates of Class A offices by the end of 2019 were higher than their 10-year average, while Class C occupancy stalled below its 10-year historical average, showing early signs of a trend that could accelerate in post-pandemic times.[38] In New York City, Class A comprised almost 90% of closed office deals in 2019.[39]

Going forward, Class B and Class C buildings will be especially vulnerable to vacancy and may fall into financial distress. According to the commercial real estate services firm Cushman & Wakefield, approximately 140 million of Manhattan's 400 million square feet of office space is of average quality or is located in older buildings.[40] The changing use of the office and potential excess supply have important implications for both the commercial office market and for central business districts as a whole. Cities will need to work with the real estate industry to encourage the development of more mixed-use buildings and neighbourhoods, with adequate public space. Converting office into residential space as part of a larger mixed-use strategy can also support the affordable housing crisis. Converting just 10% of that office space in New York City into residential property would create 14,000 apartments.[41]

It is also important to note the need for cybersecurity in terms of resilience. *The Microsoft Digital Defense Report* describes the increase in sophistication of attacks during 2020 and notes that remote work is an especially vulnerable target.[42]

4. Affordability: Delivering reduced life cycle operational costs

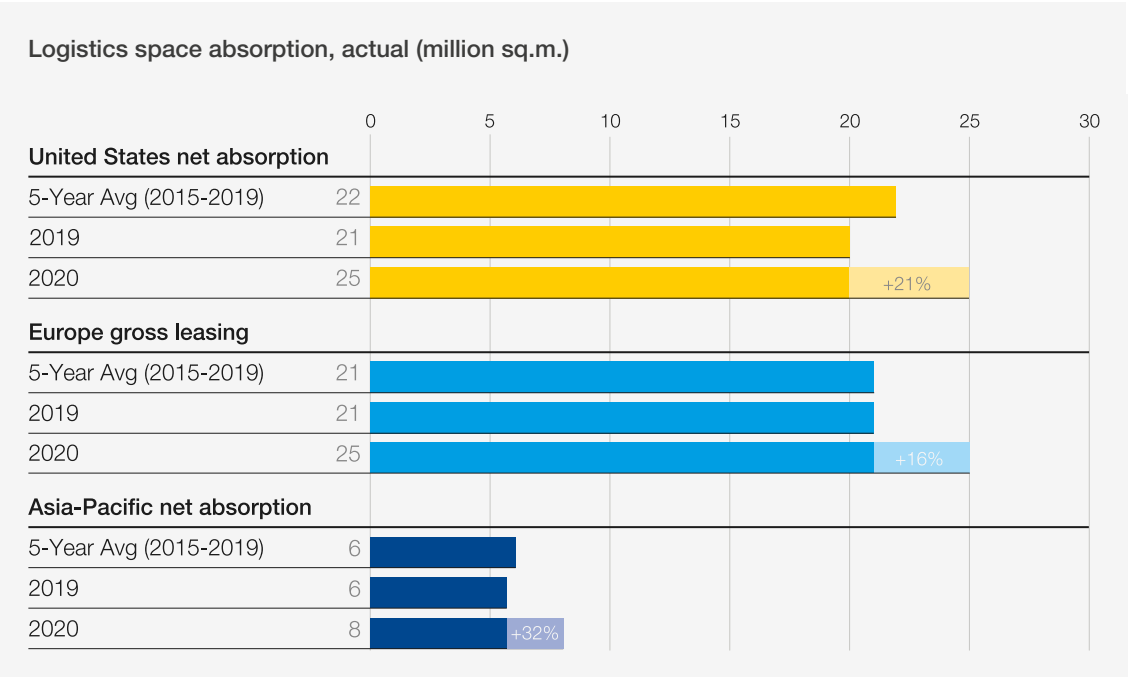
The real estate industry has been fragmented. Traditionally, a developer builds a building, an investor buys a building and an occupier will occupy a building and their incentives have not been aligned. Nowhere has this been more prevalent than in the office sector, with traditional office developers seeking to build at the lowest cost, without taking into consideration operational expenses. However, as the demand for net zero carbon buildings increases from environmental, social and governance (ESG)-driven investors and occupiers, developers will need to align their incentives with investors and occupiers, focusing on the life cycle costs as well. These buildings may require a slightly higher upfront investment but will be more affordable in the long term as they will have reduced operational costs. In addition, these buildings are more desirable to occupiers. JLL research has shown that more sustainable buildings command increased rental values of 6-11%[43] and have fewer void periods.

Improving transparency in real estate, particularly in relation to service charges, is also critical to help lower overall costs. When service charges are completely opaque, it is difficult for tenants and landlords to work together to try to address cost areas such as utilities.

3.3 Industrial and logistics

In recent years, industrial portfolios have been dominated by logistics facilities (Figure 12) as the double-digit growth of e-commerce, coupled with the steady increase in consumer spending, has driven demand in the asset class.

FIGURE 12 **Industrial and logistics growth drivers**



Notes: US: net absorption, based on 55 city markets; Europe: gross leasing (take-up), based on 11 national markets; Asia-Pacific: based on 26 city markets with staggered starting point for some markets, Gross Floor Area. Some AP markets do not publish data quarterly.

Source: Based on JLL, *Global Real Estate Perspective*, February 2021.

This growth is accompanied by increasing demands concerning the performance of logistics facilities. E-commerce-related logistics are three times more labour intensive than traditional operations and online sales are twice as volatile as those from brick-and-mortar stores.[44] Consumers are demanding shorter and shorter delivery times – typically overnight – and are three times more likely to return items purchased online than those bought at a physical store.[45] In addition, the reverse logistics supply chain requires an average of up to 20% more space and labour capacity compared with forward logistics, according to Optoro.[46]

To ensure healthy margins for retailers, the increasingly complex logistics ecosystem will require transformation:

1. Fully automated, cost-effective supply chains integrating last-mile delivery centres in urban areas
2. Sustainability at both the building level and in freight operations
3. Liveability by prioritizing employee health to prevent accidents and illness.

1. Fully automated, cost-effective supply chains integrating last-mile delivery centres in urban areas

To achieve a cost-effective supply chain, the logistic footprint must be well optimized with an end-to-end approach, which means:

- Leveraging technology and automation to gain efficiency by eliminating non-moving time and improve workers' safety
- Reinventing last-mile delivery by integrating logistic centres into cities to achieve ambitious delivery times, adopting more efficient delivery modes
- Establishing smooth reverse logistics.

Automation as a key to driving scale and efficiency
Automation, when successfully deployed, can unlock scale, improve productivity and increase site capacity, but it is also capex-intensive. Consequently, the adoption rate is highly dependent on labour intensity, process complexity and site magnitude.[47]

Overall, automation is less widely spread across the industry than expected. Prologis estimates that only 20-25% of logistic facilities have implemented some kind of automation in their operations, mainly due to high costs and low flexibility. However, as technology continues to improve – shrinking costs, growing capabilities and offering more flexibility – automation will gain ground.[48]

CASE STUDY

Ocado, Andover, United Kingdom

Ocado, an online grocery group in the United Kingdom, is a good example of automation deployed at scale. A leader in omnichannel retail strategy, Ocado processes 3.5 million items or approximately 65,000 orders per week[49] thanks to its advanced and fully automated warehouse system, which allows it to deliver orders in less than two hours. Orders are lifted, moved and sorted in a grid system by an army of coordinated robots.

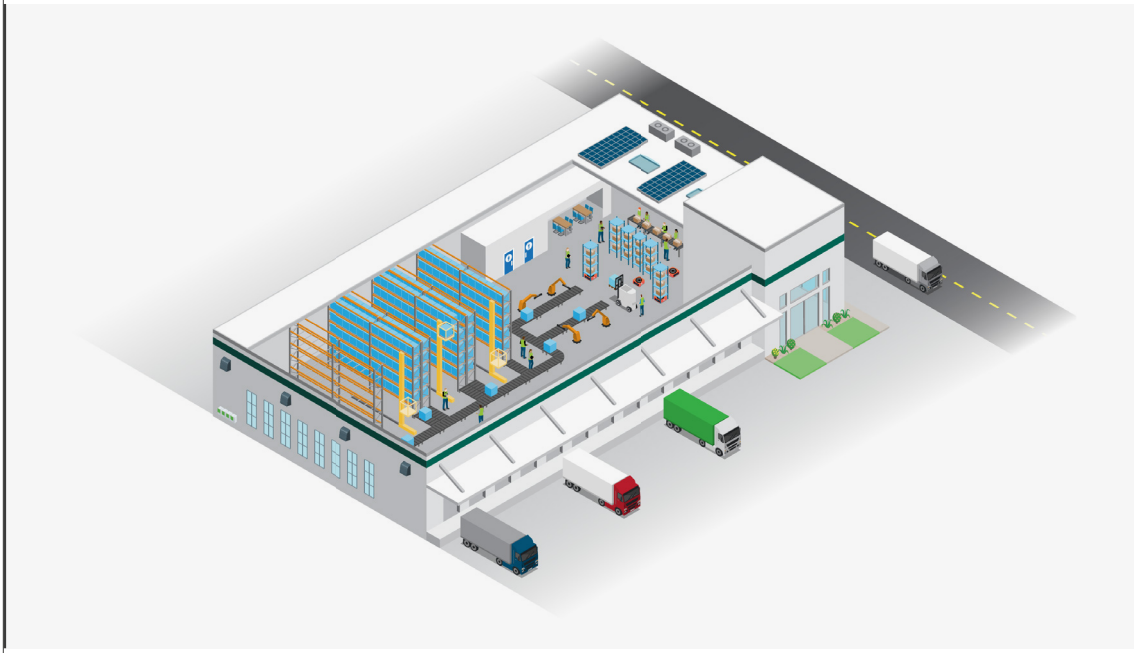
Sources: BCG research; The Verge, "Welcome to the Automated Warehouse of the Future", 8 May 2018.

With the needed increase in automation, logistics real estate will experience several changes regarding not only layout and site amenities, but also location. The new sites designed to accommodate automation will need to include a few key features, as shown in Figure 13.

Implications of automation on design:

- Structure: Automation requires structurally strong roofs – as fixed automation sometimes requires connection to the roof – and robust building foundations with sturdy floors that support the weight of machines.
- Space: Automation also requires sufficient ceiling height. To avoid inventory build-up on the floor, sorting and delivery processes must be smooth, which will increase the need for dock doors. Wider office spaces are necessary to control operations and ensure the optimal functioning of automation structures.
- Technology: Advanced modular telecommunications solutions (i.e. connectivity) can not only provide enough speed to manage great volumes of information but can also be upgraded as technology evolves. In addition, power capacity requirements may increase by 1.5-4 times depending on the level and type of automation that the site integrates, increasing the importance of sourcing clean energy.

FIGURE 13 **Implications of automation on design**



Source: Prologis, "Automation and Logistics Real Estate #1: The State of Automation in Supply Chains", November 2020, https://www.prologis.com/logistics-industry-research/automation-and-logistics-real-estate-1-state-automation-supply-chains (accessed 25 February 2021).

Integrating last-mile into the urban core

Given that last-mile delivery entails the greatest share of distribution costs, typically 40-50% of delivery costs,[50] moving operations as close as possible to the final delivery point helps achieve agility and flexibility while reducing costs. This requires either integrating delivery facilities closer to the urban core and outside more industrial zones where warehouse facilities are traditionally more prevalent, or incentivizing customers to choose more efficient delivery modes.

Urban infill logistics absorption to date has been well below that of non-urban locations – less than 20% according to JLL research.[51] High real estate costs, the absence of available space, and zoning all present hurdles. Industrial land near city centres has been lost to other asset classes that at the time were highest and best use, such as residential.[52]

However, the availability of spaces from vacant assets in light of COVID-19, the growing flexibility and adaptability of automation that will improve site productivity, paired with projected increased volumes of e-commerce, will make urban locations an attractive opportunity to decrease last-mile delivery costs.

Vertical facilities

To deliver orders under extremely short lead times – typically same-day delivery or even two-hour and one-hour delivery services – operators must be near the end customer, and vertical facilities are one of the most economical and feasible solutions. In the words of Hamid Moghadam, Prologis' CEO, "You have to go vertical [to deliver] because you can't find a 50-acre space in the middle of a city close to the customer."[53] Multistorey facilities are becoming more common, especially in densely populated cities, and are mainly powered by automation – racks, conveyor belts, lifts, etc.

CASE STUDY **Prologis Park Amagasaki 3, Amagasaki, Japan**

Sources: BCG research; Prologis, "Prologis Park Amagasaki 3", 2021, https://www.prologis.com/industrial-logistics-warehouse-space/japan/amagasaki/prologis-park-amagasaki-3 (accessed 12 February 2021).

The four-storey facility in Amagasaki, Japan includes a photovoltaic (PV) system that generates electricity from solar panels, and green space on the roof to help mitigate the heat island effect and cool the inside of the building. Spiral ramps for entry and exit help reduce the time involved in transporting goods by elevator.

Underground facilities
Cars are estimated to be parked 95% of the time, so the space devoted to parking is significant. Taken together, these scattered fragments of real estate constitute a great expanse – an area in the United States as vast as the state of Connecticut.[54]

Changes in urban mobility will free car parking space for other uses, emphasizing the need for flexible space to accommodate uses from logistics facilities to mobility-oriented developments that can house bike or scooter shares. Research from MIT suggests that shared mobility and autonomous vehicles could eliminate 86% of parking spaces. New projects, such as the 280-metre CapitaSpring skyscraper in Singapore, are designing parking lots to be easily adaptable for other uses.[55]

CASE STUDY

Chronopost, Paris, France

In the Place de la Concorde, a former city-administered parking lot of 1,000 square metres has been transformed into a logistic hub for Chronopost. Another facility, also developed by Chronopost in partnership with Sogaris and public authorities, is located in Beaugrenelle below an existing building that specialized in packages weighing less than 30 kg, using electric vehicles and offering the possibility to pick up the order directly on-site.

Sources: BCG research; DPD Group, "Chronopost announces the delivery of the entire city of Paris in low emission vehicles", Press Release, 2 October 2019, https://www.dpd.com/group/en/2019/10/02/chronopost-announces-the-delivery-of-the-entire-city-of-paris-in-low-emission-vehicles (accessed 12 February 2021).

Reconversion from other asset classes
In addition to reconversions of underground parking lots, unused retail assets or even office buildings can be repurposed for logistics.

To ease the path to repurposing, one major challenge is zoning. Asset reconversions often require zoning adjustments to change use and ensure the necessary floor area ratio is allowed. This is a difficult hurdle to overcome, as retail assets are usually close to residential areas and communities typically do not want the noise and congestion that comes with distribution facilities. City councils may also be hesitant given the perceived loss of sales tax revenue from stores.[56]

There are some space constraints when repurposing assets. Typically, larger sites (greater than 20,000 square metres) can be more easily repurposed than smaller lots.[57] Some successful examples of retail conversions are from Sam's Club, along with Amazon, in reconverting retail assets into fulfilment facilities. US retail stores in Chicago, Memphis, Milwaukee and Tampa are being converted into online delivery centres.[58]

After the pandemic's onset, retail-to-industrial property conversions accelerated in the United States. According to a survey conducted by CBRE, currently 59 projects have either been completed, proposed or are under way since 2017 – up from 24 in January 2019.[59]

These projects are primarily taking place outside urban areas, in large malls and department stores. However, going forward, the industry will need to start dealing with smaller assets that experience long-term vacancy or fall into distress, such as vertical parking and ground floor retail.

In addition, incentivizing customers to choose more efficient delivery modes can also cut last-mile delivery costs. Another option to gain efficiency in last-mile distribution is to incentivize customers to adopt solutions that are less cost intensive for logistics operators, such as in-store pick-up or alternative pick-up points, such as using third-party retail locations like convenience stores, or offering discounts to consumers who accept longer delivery times.

E-commerce will also reinforce the requirements for effective reverse logistics. The increase in e-commerce will lead to a surge in returns, as there is usually little, if any, cost to the consumer for returning products. It is estimated that 25-40% of the goods acquired online in the United Kingdom are returned while, in Germany, this figure may reach up to 50%.[60]

Thus, reverse logistics facilities will need to be increased. Traditionally, these types of sites have mostly been operated with manual processes involving many employees, as the condition of returned items needs to be checked and possibly restored. Selected logistics providers, such as Clipper Logistics or Hermes Fulfilment, specialize in reverse logistics, leveraging automation to industrialize the process and serve multiple retailers.

Another effect that e-commerce is having on cities is a surge in the costs of sorting waste from packaging. Municipalities may consider imposing a tax on e-commerce deliveries to help pay for the additional costs of transporting and processing packaging waste, but these taxes would likely be passed on to consumers. New York City is evaluating a $3 surcharge on online packages to help fund public transit.[61]

2. Sustainability at both the building level and in freight operations

Building construction and operation

Advances in technology can help ensure sustainability in facility operations. Renewables, efficient design and energy demand–supply optimization are key levers.

CASE STUDY

Lidl warehouse, Järvenpää, Finland

Lidl's Järvenpää warehouse in Finland operates 100% with renewable energy and has a negative operational carbon footprint. The warehouse has been equipped with a microgrid, including 1,600 solar panels, a battery storage system and a cogeneration plant supplying heating and cooling. The microgrid is digitally enabled to optimize supply–demand balance in real time, applying a predictive energy management approach that combines real-time data collected from multiple IoT sensors – occupancy, thermal and electricity demand, etc. – with external information – energy pricing, weather forecasts, etc. In addition, Lidl's warehouse has been integrated within the community to supply the excess energy to surrounding homes. The condensed heat generated by cooling processes is distributed to the district's heating system, which makes it possible to supply warm water to up to 500 single-family homes.

Sources : World Economic Forum research; Schneider Electric, "Lidl Finland Microgrid Enables Carbon-Neutral Distribution", https://perspectives.se.com/drive-sustainable-growth/lidl-finland-microgrid-carbon-neutral-grocery-distribution (accessed 12 February 2021).

Because of the COVID-19 pandemic, online grocery experienced peak demand in 2020, with penetration of around 7-10% expected to settle to 6-8% in 2022, driving demand for cold-chain storage.[62] Such facilities will also be fundamental to ensure an effective COVID-19 vaccine roll-out. Electricity consumed for refrigeration accounts for around 15% of global demand,[63] creating significant carbon emissions. The electrification of demand, supply through renewables and increased efficiency of refrigeration technologies can reduce emissions of cold-chain storage. Cutting-edge systems include carbon dioxide cascade refrigeration systems, energy efficiency evaporator and condenser design, highly reflective white thermoplastic (TPO) roof membranes, high-speed bi-parting freezer doors and high frequency and opportunity battery charging.[64]

Delivery

Freight operations are responsible for a large share of the overall logistics footprint, and approaches to decarbonize will vary between first- and last-mile facilities.

First mile

First-mile mega distribution centres that distribute regionally should ideally be multimodal, with minimal use of planes, which are the most polluting mode of transportation. Ports should be linked to an efficient inland transportation network, preferably dominated by rail, to minimize reliance on trucking. When possible, barges can be used as they can transport more cargo than trucks and help reduce road congestion. Even though barges are relatively energy-efficient, the use of electric barges could help to reduce emissions even more. For example, in Paris, electric barges deliver cargo to four city centre quays, from which last-mile operators deliver goods to consumers.[65]

Looking ahead, a clean alternative for transportation and deliveries is fuel cell vehicles (hydrogen-powered vehicles). Nevertheless, given the high cost of the equipment and hydrogen itself, this technology is expected to be more suitable for long-haul transportation. According to a BCG analysis, by 2030 the sales of fuel cell vehicles, which are still expected to be limited, will be mainly heavy- and medium-duty trucks for long-haul and intercity transportation.

Last mile

The sustainability of last-mile deliveries can be fostered by:

- The electrification of transportation: Deploying the infrastructure required to allow ultra-fast van charging should enable the shift to electric deliveries, as e-mobility has cost advantages over traditional fossil-fuel-powered vehicles.
- Bike and on-foot deliveries: Nearby deliveries can be made via bike or on foot. Advantages over road transportation are greater delivery speed in highly congested areas, access to car-free areas and zero emissions. Certain operators, such as DHL and UPS, have already implemented bike deliveries in major cities.

3. Liveability by prioritizing employee health to prevent accidents and illness

Guaranteeing optimal building conditions, including adequate temperature, air quality and lighting, to ensure health and safety is crucial.

CASE STUDY

ArcelorMittal Plant, Sagunto, Spain

In its Sagunto plant in Spain, ArcelorMittal has replaced its former in-house managed lighting system with Signify's Light-as-a-Service model, delivering three main benefits:

- Visibility has substantially improved, eliminating the previous "yellow" cast and providing visual comfort.
- Productivity has increased, as lines no longer need to be stopped to replace damaged lighting, and employees' mental fatigue has diminished.
- Energy consumption has been reduced as the new LED lighting system is much more efficient.

Sources: Signify and World Economic Forum.

Alternatively, workers' health and safety can be fostered by adopting autonomous and/or contact-free deliveries, such as Refraction AI's REV-1 robot for food deliveries. Although autonomous deliveries remain minimal currently, robotics could be a feasible solution to address many last-mile delivery challenges, such as urban congestion and inefficient sorting, while ensuring safety.

It is important to note that other types of industrial uses have also experienced recent effects from the pandemic, with long-term implications:

- **Manufacturing**: A recent BCG global survey found that 43% of companies plan to make permanent changes to their supply chain structures because of COVID-19. Factories in Asia-Pacific will target the huge, continually growing domestic market, while factories in North America and Europe will concentrate on local markets.[66] By reshoring manufacturing facilities, companies are seeking to build more resilience, mitigate risk and secure better access to supplies. The decision will be influenced by two key factors: the so-called "impetus to change", which involves economic and political pressures, and "the ease of adjustment", which comprises the difficulty of replacing certain suppliers and the costs of capital associated with moving to new locations.
- **Self-storage facilities**: Demand is driven by major positive and negative life events. COVID-19 has enforced change on people, underscoring the need for storage space.[67]
- **Data centres**: These centres have thrived during the pandemic, with only minor setbacks from project delays in early lockdown phases.[68]

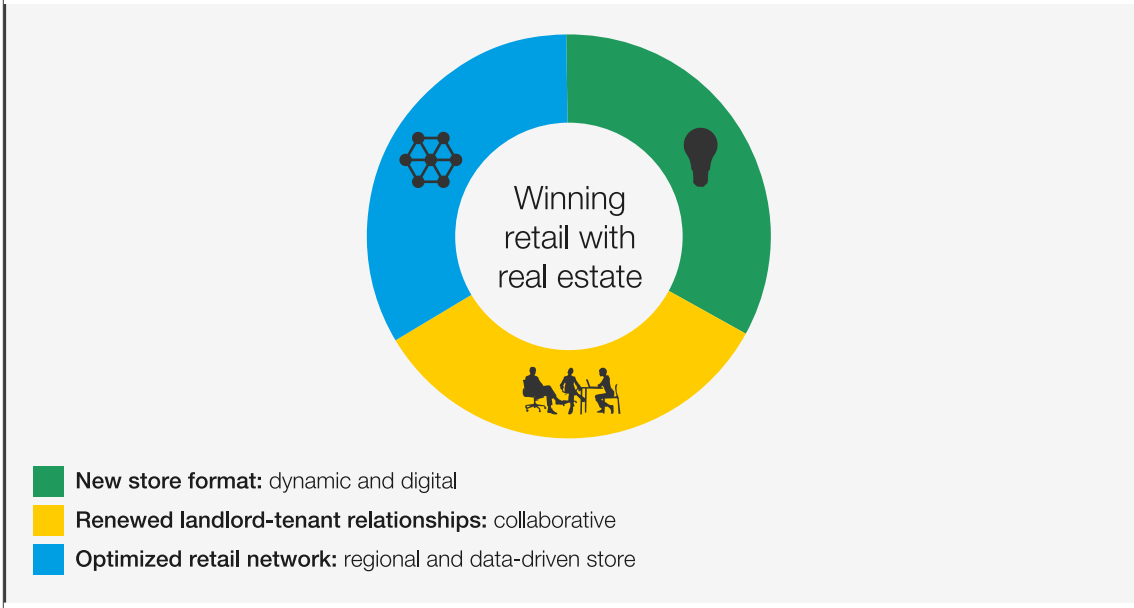
3.4 Retail

Before the pandemic, even amid the growth of e-commerce penetration, retail square footage had increased globally by 15% since 2010,[69] showing that physical and digital channels are complementary. However, in order for offline retail stores to play an effective role in the omnichannel retail mix, long-term transformation is required.

The pandemic has severely impacted retail, with only a few exceptions, such as grocery retail. As many as 25,000 stores are expected to close in the United States alone,[70] a number that will surely rise if retailers do not adapt to changing consumer needs, including the way in which people shop. While many efforts are under way, from investments in technology and sustainability to initiatives focused on differentiation and operational efficiency, the need to rethink the real estate component of retail is now urgent.

As illustrated in Figure 14, to thrive, retailers must rethink their approach to their store portfolio and retail network, integrating them into a rebranded omnichannel strategy.

FIGURE 14 | **Winning retail with real estate**



Source: BCG analysis.

The retailers that develop this vision will be able to compete, innovate and resume growth. Retailers should manage the store network as a dynamic asset that integrates physical and digital channels to fulfil customer needs by building:

1. **Liveability**: Dynamic and digital store formats that create fruitful customer experiences
2. **Sustainability**: Replicable designs that support decarbonization
3. **Resilience**:

   3.1 An optimized and data-driven asset network supporting omnichannel retail

   3.2 New landlord–tenant collaborative models

1. Liveability

Physical stores provide an opportunity to add value and secure brand loyalty through the customer experience and added services. To do so, retailers can focus on two areas:

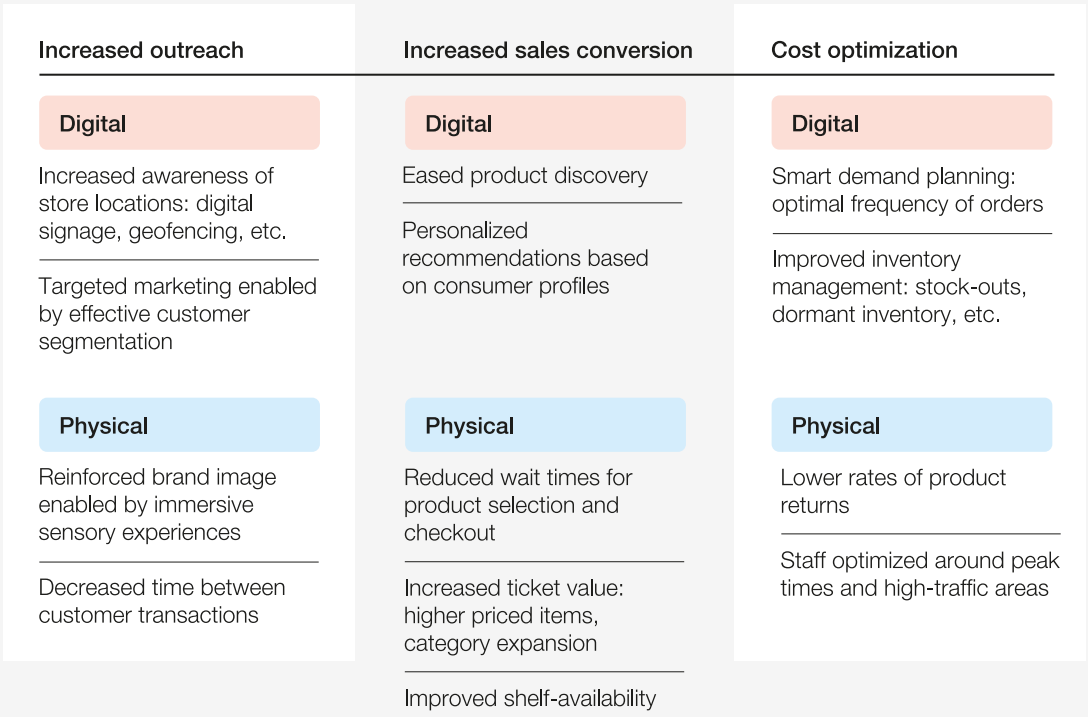
- Store design: flexibility to adapt physical space to evolving customer needs
- Digitalization: solutions that drive efficiencies and provide personalized service.

I. Continual, flexible and fast store format redesign

Given that renovation processes are time-consuming and costly, retailers have been upgrading and redesigning store layouts slowly (i.e. 4-5 years). Stores of the future will require flexible, quickly adaptable and customizable spaces that respond to constantly changing customer needs. Easily adjustable displays to feature new products, offering product trials in-store or chances to share feedback on product development can help change the atmosphere.

Retailers may also offer diverse in-store experiences. Sport retailers, like Nike, allow product trials, such as trying running shoes on a treadmill.[71] Banks, such as Santander, have installed cafes in some of their branches to help build their brand and attract new customers.[72] Figure 15 displays the key advantages to experiential retail.

FIGURE 15 | **Benefits of experiential retail at physical stores**



Source: BCG analysis.

The experiential approach has been proven to boost spending, in what Harvard and Wharton research has called the "supercharging effect". Through analyses of the transactions of a digital retail brand that had opened physical showrooms, their study showed that when the physical interaction takes place effectively – e.g. personalized service provided by a salesperson, product testing and feeling – customers spend up to 60% more on average on a particular order, and the time between purchases is reduced by 28%. They also have a tendency to buy 20% more categories of products and return fewer items.[73]

Critical to achieving this dynamic store format is customer feedback. Retailers should leverage all channels – both digital and physical – to obtain feedback and quickly adjust in response.

II. Digital solutions to recast the role of physical stores in retailers' omnichannel strategies

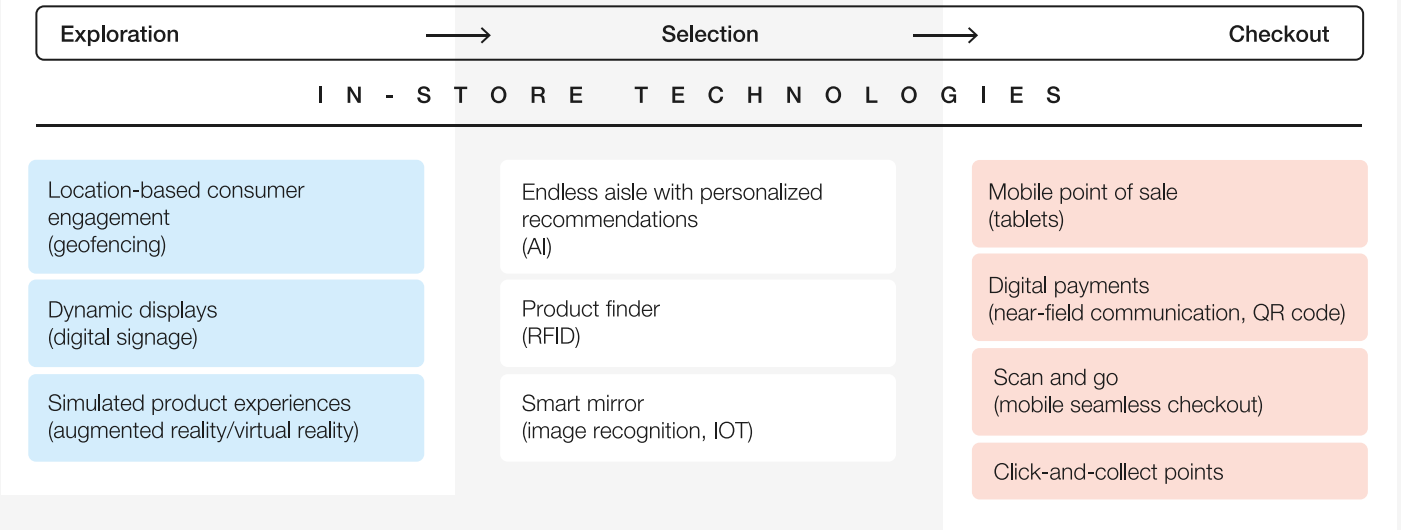
Companies should incorporate digital solutions to enrich the in-store journey with an end-to-end approach, including exploration, selection and checkout. Figure 16 presents the technologies that support the three steps of in-store transactions. Although these technologies are typically installed at flagship stores, it is now time to expand them to the overall real estate portfolio.

Exploration: These technologies aim to amplify the store search and product discovery process. Digital signage with touchscreens makes it easier and more enjoyable for consumers to navigate stores. Augmented and virtual reality technologies enable people to interact with products, enhancing the overall brand experience. Geofencing can help retailers attract consumers' attention in close proximity to the store with targeted offers, new deals and the latest products.

Selection: Several technologies also help expand the number of products available and make product selection more seamless and personalized. "Endless aisle" technologies allow consumers to browse or order items that are currently out of stock. Artificial intelligence (AI) algorithms can make recommendations based on their profile. For example, apparel retailers are using visual AI through smart mirrors to recognize what consumers are wearing and recommend new outfits based on their style. Grocery chains are using smart labels to provide product information, such as detailed dietary descriptions of ingredients and allergens. Shoppers just scan the label with their smartphones. Through radio-frequency identification (RFID) technologies, consumers can also quickly verify the availability of products that, if not currently available, can be ordered and delivered to the home or store, or similar products can be offered as an alternative.

Checkout: Companies are using digital technologies to make the checkout experience seamless. Smart wallets, sensors and scan-and-go capabilities through a smartphone app provide a cashier-free experience. Additionally, the checkout process could be integrated with online channels by setting click-and-collect points where consumers collect their online purchases smoothly without waiting in line.

FIGURE 16 | **In-store technologies**



Source: BCG analysis.

2. Sustainability

Given the often multi-store nature of retail real estate footprints, having a comprehensive strategy to tackle decarbonization is important. Also critical is for tenants and landlords to work closely together to understand and improve building performance and to undertake design that incorporates net zero carbon goals, including using low-carbon materials strategically, employing circularity when changing displays and addressing overall energy usage.

CASE STUDY

McDonald's, Melton South, Australia

The 1,000th McDonald's restaurant in Australia is a template of what McDonald's and the rest of the food services and retail industry can achieve for a more sustainable future. The new store design will help McDonald's cut its greenhouse gas emissions for its restaurants and offices by 36% by 2030. The design incorporates many of the latest innovations in microgrid management (solar, demand response, etc.) and in building control (ventilation, refrigeration control, etc.). A distinguishing feature of the design is its "repeatability". The new restaurant is not a one-off; everything was designed to be easily replicated anywhere in the world, helping to lower overall planning and development costs.

Sources: Schneider Electric and World Economic Forum.

CASE STUDY | **Corporate Green Sukuk, UAE**

The business case for financing green building development and retrofit is solid and investor appetite for more ESG-focused investments is strong. In 2019, Majid Al Futtaim issued two corporate Green Sukuks (an Islamic bond) in the Middle East valued at $600 million each, which were more than five times oversubscribed. The proceeds will be used to finance future green building developments and renovations, which include a large retail portfolio, along with renewable energy and sustainable water management projects. One project example is the green building operation and maintenance of the company's shopping mall assets, including the City Centre Mirdif in Dubai (pictured).

Sources: Majid Al Futtaim and the World Economic Forum.

3. Resilience

Given the tremendous evolution of retail throughout the past decade, resilience is a key feature that is needed to ensure that the future of retail real estate can withstand changing consumer demand and economic vulnerability, along with a variety of other threats, including public health and climate hazards. Two ways to address resilience include:

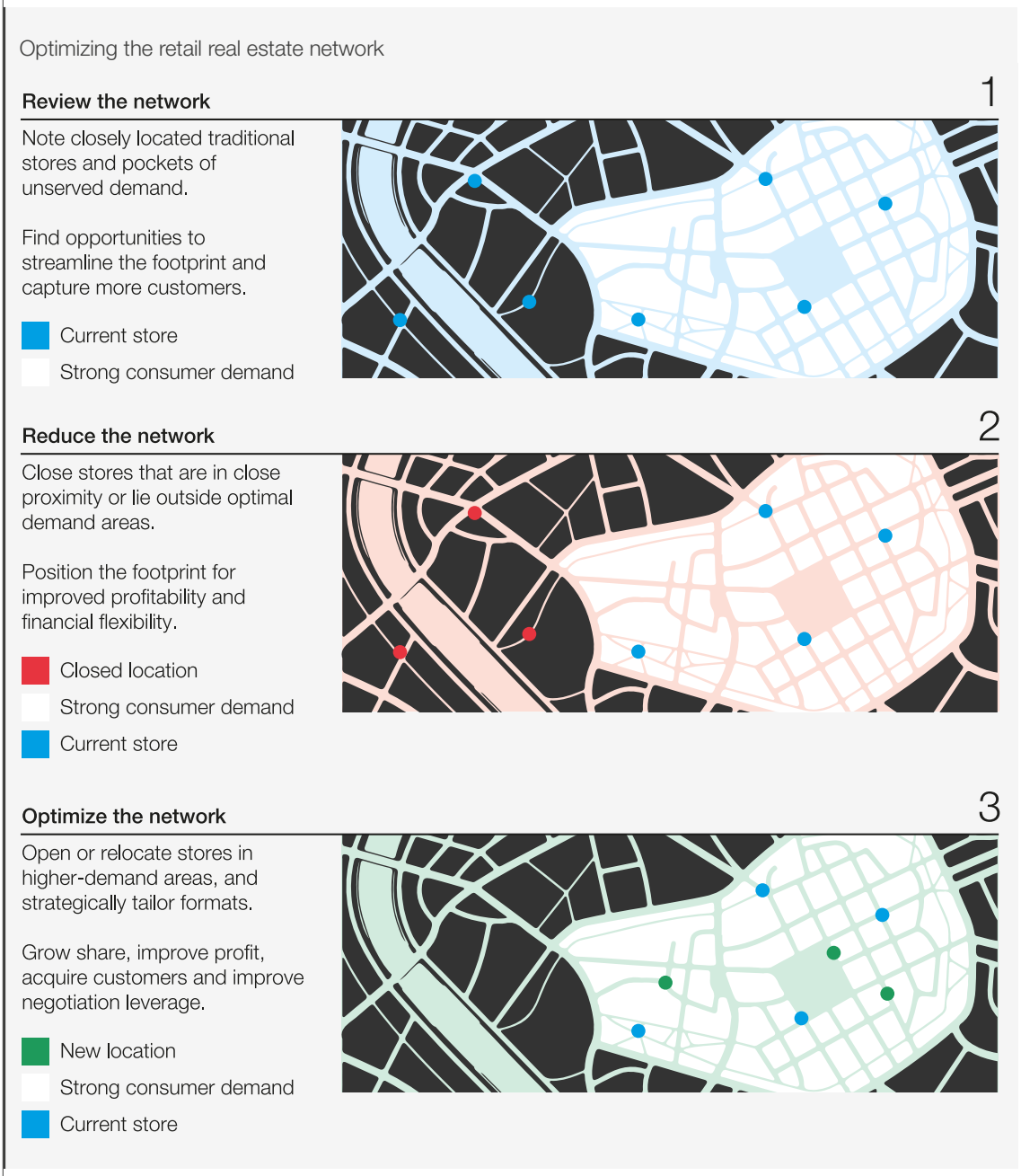
3.1 An optimized and data-driven asset network supporting omnichannel retail

3.2 New landlord–tenant collaborative models.

3.1 An optimized and data-driven asset network supporting omnichannel retail

A shift in focus is required, from individual profit and loss accounts on which the performance of each store is measured exclusively on a revenue-per-square-metre ($/m^2) basis, to a portfolio approach that also integrates online channels. Retailers should design an optimal network of outlets that complements and supports their omnichannel strategy. Profitability should not only shift from an individual to a regional approach, but should also integrate the impact of the data generated at stores on the bottom line, as shown in Figure 17.

FIGURE 17 | **Regional approach to store optimization**



Sources: BCG analysis; based on Mitchell, Adrian, et al., "Winning the Future of Retail with Real Estate", BCG, 7 August 2020.

With respect to the portfolio approach, the focus should be on optimized regions addressing local markets, not on individual locations. Through machine learning techniques, retailers can identify addressable consumer demand, project store and digital performance, and anticipate the operational benefits and costs of legacy decisions. Visualization tools enable real estate professionals to build and vividly portray revenue and margin scenarios involving store openings, relocations and closings in a market in real time.

In addition, the information that can be generated at retail stores is endless: most viewed items, customer reactions to pricing, customer flows within the store, customer feedback, etc. In this era of technology, data is the most valuable asset for retailers – as it leads to customer knowledge – and physical stores are where it is widely generated. So, in addition to profitability metrics, store performance should also be assessed using the data generated per square metre (data/m^2).

3.2 New landlord–tenant collaborative models

Traditionally, the relationship between tenants and landlords has been somewhat distant, with interactions limited to price negotiations and contract renewals. Few efforts have been made to develop the relationship further.

The new omnichannel retail model, which requires constant evolutions, involves a closer relationship between landlords and tenants. Relationships should become collaborative, with both parties actively involved in promoting flexibility and sharing risks.

Flexibility

While long-term leases between 3 and 6 years have been standard, the dynamic omnichannel model requires flexible leases to adapt to locations quickly (6-12 months). During the pandemic, flexibility increased. For example, Link REIT in Hong Kong SAR brought flexibility to tenants by offering short-term leases that allowed them to make business decisions as the pandemic situation evolved.[74]

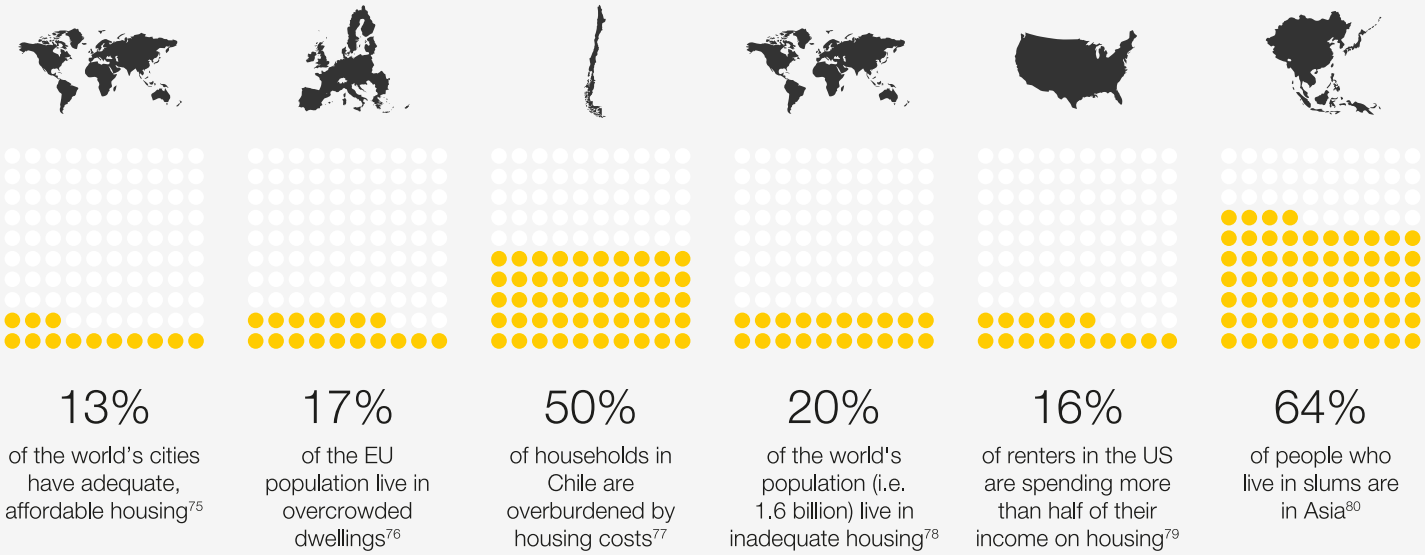
Risk sharing

The current model, in which leases are based on fixed payments, puts all of the pressure on the retailer, without sharing any of the risks. A mixed-lease structure, comprising both fixed and variable payment (which depends on asset performance) will support the interests of both the landlord and the tenant. Physical real estate has the potential to become a growth driver for retailers, but it needs to be complemented with an experiential approach that merges physical and digital channels.

3.5 Housing

Housing is a basic service that should be available for all of society to ensure safety and well-being. However, for a large share of the world's population, housing represents a huge cost burden and is largely inaccessible, as illustrated in Figure 18.

FIGURE 18 **Affordability issues worldwide**



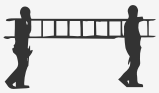
Sources: BCG and World Economic Forum.

Given the importance of adequate housing for individuals and communities, the real estate industry must ensure:

1. **Affordability**: by collaborating with public authorities
2. **Liveability**: by reinforcing health and well-being when designing housing
3. **Sustainability**: by supporting decarbonization and making certain energy efficiency is not a trade-off of affordability
4. **Resilience**: by fortifying against a variety of threats to ensure housing can withstand shocks or be quickly replaced in the aftermath of structural damage.

FIGURE 19 | **Affordability framework**

Affordability includes not only financial access but also liveability standards.



Financial

Access costs	Running costs
Economically sustainable rents or mortgage rates/loan to value ratios	Maintenance, insurance, taxes, utilities, etc.

Living standards

Size	Condition	Location
Sufficient space	Healthy conditions: air quality, lack of humidity, insulation, etc.	Basic services within reasonable distances

Sources: BCG and World Economic Forum.

1. Ensuring affordability by collaborating with public authorities

Defining affordability: Financial sustainability ensuring quality living standards

Housing is deemed affordable if the occupants can pay all the costs – access/acquisition and operational costs – on a long-term basis, while still being able to maintain a minimum standard of living, which includes liveability elements like adequate house size, healthy conditions and proximity to amenities and public transit as presented in Figure 19.

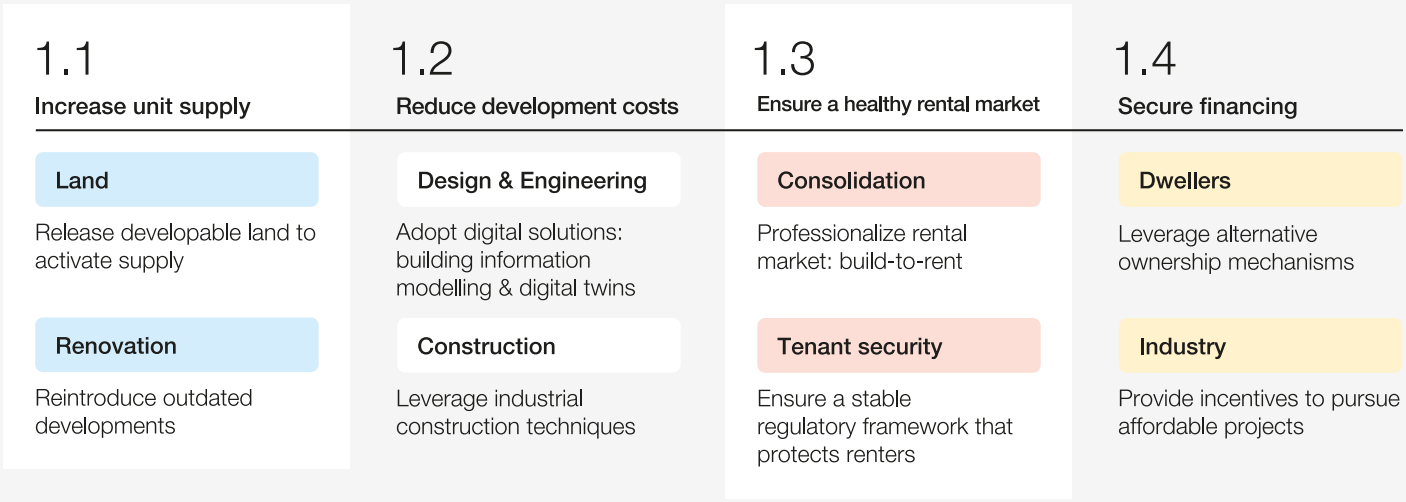
Affordability is conspicuous by its absence and the future looks bleak if action is not taken to address inequality. The need for housing is expected to maintain its upward trend in the medium term since the global population is expected to rise, albeit at a lower rate, with average household size also decreasing in every geography.[81]

The COVID-19 crisis has also further exacerbated economic inequality and will deepen the housing crisis.

> **Even as COVID-19 infection rates continue to rise in many areas around the world, we must look for practical and effective strategies to emerge from and recover from the pandemic's devastating effects. Housing is going to be key in those efforts – and here are five steps we can take in that direction:**
>
> **1. Focus on healthy housing.**
>
> **2. Take action to move forward on the critical housing targets in the UN's Sustainable Development Goals (SDG).**
>
> **3. Raise awareness of housing as a significant contributor to national economies.**
>
> **4. Employ specific housing finance strategies to help low-income families.**
>
> **5. Provide relief for families at risk of being evicted or of losing their homes.**
>
> Jonathan T.M. Reckford, Chief Executive Officer, Habitat for Humanity International, USA. Summarized from "5 ways to tackle the housing crisis after COVID-19"

The affordability challenge requires a comprehensive solution that addresses the issue holistically, activating cooperation between the industry, public authorities and the investment community. Figure 20 illustrates an affordability framework developed with four clear areas of action.

FIGURE 20 | **Actions to accelerate affordability across housing markets worldwide**



Sources: BCG and World Economic Forum, based on World Economic Forum, *Making Affordable Housing a Reality in Cities*, Insight Report, June 2019.

1.1 Increase unit supply, widening land availability and activating major renovation plans

Part of the issue is driven by an insufficient supply to satisfy the huge market demand.[82] To reduce pressure on pricing, housing supply must be increased. Two methods can address both greenfield and brownfield developments.

I. Ensure land availability to develop greenfield projects

- **Acquire underdeveloped land**: As cities grow and their needs change, land use must be re-evaluated and underdeveloped or nascent areas can be harnessed for necessary housing development. Formal policy instruments can allow land acquisition to support housing, including land pooling, negotiated settlements and formal acquisition.

- **Utilize state-owned land**: Governments own a significant amount of land that in many cases is unused, which could be redeveloped for housing. By soliciting proposals from private or non-profit developers using a ground lease model to retain long-term control of the land, the public sector can support supply.

- **Establish land ownership**: Fragmented and unclear land ownership prevents land development. This is particularly worrying in developing countries, since 70% of land rights in emerging economies are unregistered, according to UN Habitat.[83] Establishing clear appraisal and registration procedures can help bring these pieces of land to market.

- **Adjust zoning regulations**: Conventionally, single-zoning instruments have exclusive land uses, which in some cases could be counterproductive if regulation does not reflect certain community necessities (e.g. low density vs high density). Updating land-use restrictions will allow for developments that better serve the unique needs of each neighbourhood.

II. Activate renovation programmes

Renovation efforts are critical not only to address affordability but also to boost sustainability and overall housing quality. Sadly, less than 2% of the building stock is renovated annually in Europe.[84] A significant share of current housing is outdated, sometimes to the degree that it is uninhabitable, further reducing overall supply. In addition to increasing overall supply and improving liveability, renovation also helps achieve decarbonization targets.

Ultimately, 100% of the stock will need to become carbon neutral, which means that, on top of new developments, the current stock needs to be retrofitted to attain energy efficiency targets. Significant renovation requires important investment, which can further reduce affordability, as landlords pass the capital expenditures on to the tenant to generate compensating returns. Returns on sustainability investments tend to pay out over the longer term by reducing operating expenses however, so in some cases the tenant can benefit from lower overall monthly payments resulting from better building efficiency.

In the short to medium terms, governments are granting financial aid through COVID-19 stimulus packages to incentivize renovating old stock (e.g. in Spain, the United Kingdom, Australia), scale up sustainability and stimulate the economy.

Housing as employment benefits
Additionally, to increase supply and help mitigate skyrocketing markets, employers can deliver social value not only to their employees but also to local communities by developing or renovating housing. In partnership with Lendlease, Google is aiming to create a new mixed-use neighbourhood, integrating homes, offices, retail and outdoor activities, in an area currently dominated by outdated office buildings.[85] These initiatives are not limited to the largest firms, however. Two relatively small Irish companies – Walsh Colour Print and Educate.ie – have developed housing for their employees on a not-for-profit basis and sold it to them at 17% below market rate.[86]

1.2 Reduce development costs through advanced design and construction methods
Construction costs typically account for a significant share of total development costs. While the exact figure depends on the location, type of project and land condition (i.e. tenure, titling, labour planning policy, availability of basic infrastructures on-site, etc.), on average, construction comprises 40-60% of total costs.[87]

Construction advancement has traditionally underperformed other industries. Since 2000, costs have increased by 79%[88] and productivity has stalled or even decreased in the United States while, in other industries, productivity has surged by 30%.[89] Increased project complexity and the lack of innovation have been the primary drivers for the lag.

High development costs must be addressed in order to drive the affordability agenda. Advanced design and innovative construction techniques can help move the industry forward, lowering overall costs and increasing productivity to deliver projects on-time and on-budget.

I. Use advanced design
Investing in digital capabilities can yield significant savings on each project phase. While the industry has tried to incorporate building information modelling (BIM), the anticipated savings and efficiencies have not fully met expectations, resulting in a move towards digital twins, design automation, physics-based modelling and simulation technologies.

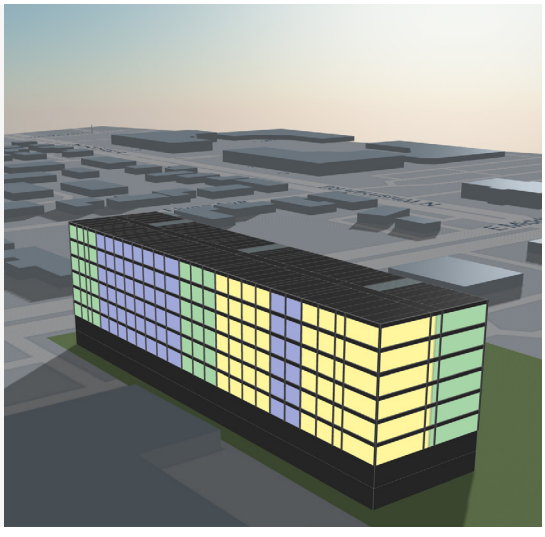
A digital twin of a building is a virtual representation of its physical, real-world entity at a scale of 1:1. The digital twin has the same embedded properties as its real-world twin, which means that the two buildings, one digital and one physical, behave exactly the same under the same conditions. This enables the behaviour of the digital replica to be simulated, analysed and optimized in digital form, essentially performing a digital rehearsal to fully resolve the building design and optimize its performance, before it is built in physical form.

Although design costs typically amount to only 5-10% of asset costs[90] the decisions made during this phase are critical for the construction phase and for determining the operating costs of the asset. Creating a library of designs that can be replicated can significantly reduce design lead times as many project pieces are already developed, and their assembly is automated.

CASE STUDY

Podium digital twins, Australia

Lendlease has successfully developed Podium, a portfolio of digital products and services that digitize the end-to-end real estate process to optimize asset design, construction and operation. Podium generates a fully resolved digital twin of a building to meet the design brief. Its outputs are not drawings but fully resolved building solutions from an engineering, performance and financial perspective. This generative design capability was harnessed to design a multistorey apartment building in a few days, a process that typically takes a team of designers months to complete. Given the speed and power of digital, Podium generates and evaluates the performance of many building options to select the optimum solution.



Sources: Lendlease and World Economic Forum.

Construction
These digital tools may be used to develop and simulate variations of construction planning and scheduling options and evaluate the trade-offs between those options in digital form, prior to executing them in the field. Lendlease used Podium on an apartment building project and by doing so managed to shorten the schedule by 9%, which resulted in millions of dollars of construction cost savings through the optimization of the construction sequence.

Operations
Digital capabilities also enable digital asset management. Simulations can help address sustainability by maximizing asset efficiency, therefore decreasing energy and utility costs, but also facilitate predictive maintenance use cases, which can result in 10-15% savings on maintenance costs.[91] Simulations can also help run quality checks. For example, in another case study, Podium was used to perform quality assurance on a design, which helped optimize that design and reduce project costs.

II. Employ innovative techniques: industrialization
Relocating manufacturing processes to prefabrication sites – where automation is achievable – to convert the construction site into an assembly point helps decrease development costs, increase unit quality and mitigate risks for workers' health and safety.

Cost efficiencies, which can amount to 25%,[92] are unlocked by standardizing and optimizing processes:

– Speed: Reduction in construction time by 30-50%, as site preparation can run in parallel to manufacturing off-site elements

– Waste: Reduction in material waste by more than half, from 10-15% at traditional sites to less than 5%

– Defects: Reduction in needed rework and overall errors.

The most advanced approach is prefabricated construction, which comprises partial or complete unit fabrication off-site and assembly on-site. The partial approach encompasses more individualized item manufacturing, often for structural components (e.g. slabs and roofs). The comprehensive approach entails a modular system that includes all structural elements as well as wiring, plumbing and other equipment.

1.3 Ensure a healthy rental market
In addition to home ownership, which may not be an adequate option for many individuals, the rental market must ensure the availability of affordable, accessible and quality housing. To achieve this, the public and private sectors need to work in tandem to ensure fair tenant protections and controls on rent increases that do not inadvertently hinder supply by reducing private-sector profitability.

Consolidation
The industry has started to consolidate the rental market through build-to-rent and co-living in order to leverage economies of scale and offer affordable solutions.

Build-to-rent (BtR) is an alternative housing model in which units are intentionally built to be rented rather than sold. Typically, a private institution will both develop and manage a cluster of individual homes. BtR models grant accessible rents to tenants due to the economies of scale in development and asset management. This model has emerged strongly in recent years (after the global financial crisis) and has positioned itself as an attractive platform for investors and the public, as BtR assets are typically acquired at a discount and provide quality housing at affordable rates.

In addition to affordable rents in downtown locations, co-living provides a social platform where occupants can interact with the community with very flexible lease terms. Although COVID-19 has slowed co-living penetration due to social distancing restrictions (or even sometimes to official restrictions, like in Ireland which has banned co-living due to concerns about minimum space standards[93]), co-living is necessary and will emerge stronger to provide affordable rental alternatives.

Security for tenants
Regulatory frameworks should protect tenants by prohibiting immediate lease withdrawals by landlords. While security for tenants is required, the regulatory framework should also be friendlier to landlords. Legislation that strongly favours renters may overburden landlords with excessive risks, which can ultimately hurt market affordability.

1.4 Secure financing
I. Tailor financing to individuals
For many households, securing financing is the major hurdle to access home ownership. Meeting down payment requirements is often prohibitive or results in an excessively high interest rate. Traditional mortgage transactions are also laden with fees and other administrative costs that can be burdensome. Automating the process can help eliminate added costs and also increase access to more affordable interest rates. A successful example is the fintech company Better.com, which has been able to reduce the overall timeline by more than 30%, eliminate administrative charges and offer interest rates around 20 basis points below market.[94]

For those who struggle to obtain mortgage loans, there are additional market alternatives that buyers could consider when planning home acquisition: shared ownership models, shared equity models and rent-to-own.

– Shared ownership model: The asset is only partially owned by the occupant (e.g. 40-60%). The rent is paid for the share of the house that is not owned.

– Shared equity model: A public investment subsidizes the home price to improve accessibility. The occupant pays into ownership of the home but the resale price is capped to ensure affordability in perpetuity. A variety of structures exist but the defining factor is preserving the affordability of the home and land.

– Rent-to-own: A lease agreement with an option to buy the asset at a future defined time, with lease payments partially contributing to equity.

II. Subsidize developers to drive affordable housing projects

In many markets around the world, there is a tangible opportunity to carry out affordable housing projects, but the risk–return profiles discourage their development.

Affordable housing requires incentives from public authorities to lower costs and reduce risk:

- Tax incentives: Tax abatements, credits and exemptions for developers and owners
- Government guarantees: Public authorities that help provide loan-loss mitigation to third-party lenders to buy-down the risk and allow the lender to provide lower rates and lend to developers and owners who are deemed less "credit worthy"
- Improved financing conditions: Deferred-interest loans recovered at resale, provided by public or private entities
- Government grants and loans: Grants and forgivable loans or discounted debt provided by governments to subsidize the development of affordable housing
- Not-for-profit assistance programmes: In addition to government support, social foundations and financial institutions that provide interest-free debt, grants and other support.

More details on affordable housing are available in the World Economic Forum report *Making Affordable Housing a Reality in Cities*.

CASE STUDY

Tour & Taxis, Brussels, Belgium

Extensa, an Ackermans & van Haaren company, developed Tour & Taxis, a mixed-use urban redevelopment project of an old inter-model freight hub in Brussels that successfully blends affordable and market rate units together to ensure inclusivity, providing 22,000 m² of affordable housing. The complex is also home to the Gare Maritime, which has office, retail and leisure spaces. The complex used timber to reduce embodied carbon emissions and create a more natural feel while still maintaining the historic architecture of the original early-1900s structures. Green space is threaded throughout the development, which required extensive collaboration with German, French and Dutch contractors.

Sources: Ackermans & van Haaren and World Economic Forum.

Additional affordable housing case studies are outlined in "10 ways cities are tackling the global affordable housing crisis".

2. Ensuring liveability by reinforcing health and well-being when designing housing

The pandemic has underscored the impact of housing on health, reinforcing the need for liveable space.

> **Good housing is the cornerstone of strong communities. Indeed, it is the provider of core shelter and protection as well as basic human needs. COVID-19 will effect profound changes in home design. Pandemic-inspired housing innovation, mainly focused on enhancements of safety and comfort, will collide with three critical forces that were simmering pre-COVID and are now at a high boil: techno-accelerations, climate resilience and social justice.**
>
> Chris Marlin, President, International, Lennar, USA. Summarized from "How COVID-19 will change the way we design our homes"

The trends with the greatest implications for housing design are remote work and the shift of senior care from facilities to family homes.

Remote work and education
New layouts need to accommodate workspace, even in small apartments, that is distinct and separate. Innovative design for small spaces has been increasing, with sliding walls to hide office space. Remote schooling could also impact student housing, at least in the short to medium terms, as a rise in investments over the past few years led to an oversupply by the end of 2019. In the United Kingdom, student accommodation investment rose from £31 billion in 2015 to £51 billion in 2019.[95] As the pandemic sent both domestic and international students back home for virtual classes, vacancies began to increase, and the asset class has become much less attractive.

Shift of senior care from facility to home
Occupancy rates for senior care facilities fell across the United States and Europe, as people brought their relatives into their own homes for safer care. Doing so has required homes to have proper accommodations with accessible and private space.

CASE STUDY

Next Gen Home, USA

Lennar, the largest home builder in the United States, has developed the "Next Gen Home", a home-within-a-home concept allowing multiple generations of families to live in the same home with separate quarters. This design offers a more affordable option to many senior care facilities or housing for young adult children. The design ensures privacy for all family members, with separate amenities, such as private bathrooms and kitchenettes while also providing common areas for connection with the rest of the family. Lennar recently included a more robust home office in this layout.

Sources: Lennar and World Economic Forum.

3. Ensuring sustainability by supporting decarbonization and making certain energy efficiency is not a trade-off of affordability

Decarbonizing the building stock means addressing residential real estate, especially as it relates to retrofitting existing buildings. Three focus areas are critical to decreasing emissions:

- Increased efficiency: Efficiency targets on renovated stock are around 50%. Measures aim at decreasing the energy requirements of buildings, while maintaining the same level of quality. Some examples of these measures are:
  - Superior thermal envelopes: Glazed windows and enhanced wall insulation
  - Highly efficient hardware: LED lighting, boilers, facilities, etc.
  - Passive ventilation: A system that circulates indoor air without using mechanical solutions (e.g. wind- or buoyancy-driven)
  - Smart systems: Digital solutions to optimize units' energy demand, such as smart thermostats and IoT occupancy sensors.
- Electrification: Electricity should supply thermal energy demand (e.g. heat) instead of fossil fuels, which provides greater efficiencies and reduces the carbon footprint – 250 gCO_2/kWh electrified demand vs 400 gCO_2/kWh fossil-fuel-based demand.
- Higher penetration of renewables: Solar PV panels can both generate electricity and heat (e.g. hot water, heating) and some boilers can work with alternative fuels (e.g. biofuels, biomass).

4. Ensuring resilience by fortifying against a variety of threats to ensure housing can withstand shocks or be quickly replaced in the aftermath of structural damage

Housing is often a focal point of catastrophic shocks, from the great financial crisis to severe weather events. Recently, the pandemic has revealed inadequacies in housing, including the lack of overall supply, insufficient space for remote work, poor air quality and economic vulnerability. Innovative design can help protect against these threats and often needs to be undertaken at both the building and city levels.

CASE STUDY

Treasure Island, San Francisco, USA

Rising on the site of a former naval station, Treasure Island is a new San Francisco community from Treasure Island Community Development, a partnership of Stockbridge Capital Group/Wilson Meany and Lennar (and partner firms), the City of San Francisco's Treasure Island Development Authority, and the US Navy. Comprised of approximately 8,000 homes, 27% of which are designated as affordable housing, three hotels, a retail and commercial mixed-use space and vast stretches of public parks and open areas laced with walking and bike trails, Treasure Island is the largest development of new open space in San Francisco since 1871. A team of engineers was assembled to address the important issue of sea-level rise and soil stability. Through testing and modelling, a programme was established to make all streets at least 36 inches higher than the base flood elevation. To strengthen the soil on Treasure Island against liquefaction and settlement, a sophisticated soil improvement programme has been undertaken, costing over $200 million.

Sources: Lennar and World Economic Forum.

3.6 Hospitality and lodging

The COVID-19 outbreak has wiped out the majority of both business and leisure travel, leaving the hospitality industry reeling. While the impact has not been uniform across the globe, in the United States revenues per available room (RevPAR) of holiday resorts in post-lockdown months was down 50% year-over-year, while urban hotels in gateway cities such as Boston, Chicago or San Francisco remained down 80-90% year-over-year.[96] With average break-even at 34-39% occupancy, the hospitality industry will need to transform to increase revenues and survive future shocks.[97]

Despite predictions that travel will not return to pre-pandemic levels until 2023 at the earliest,[98] the hospitality industry can undertake actions to mitigate the current impact and emerge stronger.

1. **Sustainability**: Reduce emissions
2. **Liveability**: Reinvent the hotel experience around personalized services, hybrid work models and health and wellness
3. **Resilience**: Repurpose distressed assets.

1. Sustainability: Reduce carbon emissions

Hospitality assets can reduce carbon emission by optimizing energy consumption and enhancing renewable resources. One way of integrating sustainability principles is to have energy calculations for future developments peer reviewed to ensure assets are optimized from conception.

Sustainability in hospitality assets does not have to be cost prohibitive, as numerous interventions can be made that generate cost savings. For example, many existing assets have redundant utility provisions and capacity, and the utility connectivity is not always efficient. Some design features may also help mitigate carbon emissions.

CASE STUDY

Jean Nouvel Sharaan Resort, AlUla, Saudi Arabia

As part of the development plan to increase tourism in AlUla, Saudi Arabia, the Jean Nouvel Sharaan Resort will be carved into the mountains to preserve the natural surroundings. This design within the rock reduces energy consumption as the surrounding mountain rocks keep the space cool and lower energy requirements by 50%. The resort will draw emissions-free, clean energy from a geothermal power plant or solar panels, and the water used will be 100% recycled. In addition, the surrounding area, known as the Sharaan Reserve, will have extensive habitat rehabilitation programmes and landscaping with local and indigenous plants.

Sources: Royal Commission for AlUla and World Economic Forum.

2. Liveability: Reinvent the hotel experience around personalized services, hybrid work and health and wellness

Hotels that reinvent and personalize the customer journey will have a lead over competing brands and properties. To succeed on this front, technology will be a major enabler.

I. Personalize the hotel experience
The end-to-end customer journey can be digitalized on a platform, such as a smartphone app, through which hotel operators can engage and communicate with their guests to customize their stays and ensure processes are seamless:

- Convenience: Streamlining and automating administrative processes like check-in and check-out (ID collection, virtual payment, invoice generation, etc.) can not only generate savings but can also improve customer satisfaction and help provide more contactless services to protect against contagion.
- Customization: Examples include choosing the preferred slots during the day to have the room cleaned or flexible room layouts where modular furniture enables guests to choose their room design prior to arrival. Another example is intelligent virtual assistants that can control lighting or order in-room dining.

II. Reinforce health and wellness
Hoteliers should reinforce their value proposition around wellness at their properties. Offerings can include digital fitness programmes on demand, offering everything from mindfulness sessions to high-intensity exercise classes or partnering with local fitness facilities nearby when on-site facilities are not feasible.

CASE STUDY

Lighting to reduce energy and disinfect surfaces, Utrecht, Netherlands

Signify has developed ultraviolet-C technology that can be embedded into the lighting system to disinfect all surfaces. This technology uses less energy in comparison to pure mechanical ventilation and filtration systems, while providing a chemical-free way to sanitize.

Sources: Signify and World Economic Forum.

III. Accommodate hybrid work models
Recently, hospitality asset owners have been catering to full-time remote workers by offering long-term accommodations where a monthly fee allows access to all hotel services. Revenue generation, however, is significantly lower than regular short-term stays so this is likely a temporary feature. An industry pulse-check survey suggests that 43% of respondents will travel less for business reasons when the pandemic ends.[99] Hotels can also transform to offer office services such as co-working spaces and office amenities mainly to attract customers looking to work remotely from somewhere besides their primary residence.

3. Resilience: Repurpose distressed assets

Continued low occupancy rates will lead to reduced revenues and in many cases prolonged closure, as numerous hotels require occupancies of 34-40% to simply break even. This figure is on the higher-end for the US compared to Europe and the Middle East and is impacted by a range of factors, including but not limited to the variety of revenue streams beyond rooms, such as food and beverage and spa offerings.[100] Occupancy rate projections for 2021 will remain challenging for hospitality assets with occupancy still being down approximately 15% from 2019 levels and RevPAR will drop approximately 30-35% with respect to 2019.[101]

Many hotel tenants and building owners may not be able to weather the financial storm and will go bankrupt. According to industry experts, 70-75% of the hotels with earnings before interest, taxes, depreciation and amortization (EBITDA) drawdowns of 50% will be able to commit to interest payments, yet only 5% of those with EBITDA contractions of 80% or more will be able to survive.[102]

To explore alternatives to make hospitality assets profitable again, strategic acquisitions, significant renovation or conversion to other uses, namely residential, may be considered. Hotels are well-positioned for residential conversion as they are built with the highest health and safety standards, and most rooms have outward-facing windows, which is not the case in many office buildings.

CASE STUDY

Motel to mixed-use development, Route 66, New Mexico, USA

Sources: BCG research; U.S. Department of the Interior, National Park Service, "Luna Lodge, Albuquerque, New Mexico", https://www.nps.gov/nr/travel/route66/luna_lodge_albuquerque.html (accessed 12 March 2021).

An iconic motel along Route 66 in New Mexico had fallen into disrepair and became a magnet for criminal activity. NewLife Homes repurposed the motel into a mixed-use development, including 30 units for low-income and disabled tenants, a community room, a training kitchen, a laundry room and office space. Funding for the project was sourced through tax credits and other grants, winning a national award for achievement in rehabilitation developments using tax credits.

CASE STUDY

Autograph Collection, Cardo Brussels Hotel, Brussels, Belgium

Sources: Aroundtown and World Economic Forum.

By 2016, the former Sheraton Brussels hotel had fallen into disrepair and bankruptcy. Aroundtown is renovating the site into a new hotel with over 500 rooms including 65 suites, enhanced food and beverage, as well as leisure amenities, such as a spa, fitness facility and pool. Pollutants such as asbestos are being removed during renovation and energy efficiency will increase 30% through modern building management systems. The redevelopment will also include reserving the ground floor for retail space to take advantage of the foot traffic from the hotel's central location and moving the reception to the second floor to maximize profitability. Revenue is projected to double that of the former hotel and both the average daily rate and the RevPAR are expected to increase 30%.

It is also worth noting the future of alternative lodging options, such as Airbnb. In response to the loss of demand, many owners have had to shift these assets to longer-term rentals. Some governments have also recognized the opportunity presented by these vacancies and encouraged owners to offer affordable long-term stays. The city of Lisbon has introduced a programme called Renda Segura, or "secure income", where landlords can rent lodgings to the city for a minimum of five years, making the city responsible for helping fill the vacancy through an affordable housing programme. Landlords also benefit from exemptions on both property and capital gains taxes.[103]

Below: @ilbusca via Gettyimages.

4 The way forward

Society now, more than ever, needs to collaborate to protect public and planetary health by managing both the immediate and longer-term implications and finding permanent solutions.

Assets of every type must be developed and retrofitted to move towards net zero carbon targets and ensure resilience against a variety of shocks. Offices will need to evolve to drive collaboration and well-being. Housing must be high quality and affordable. Industrial assets should be digitalized to drive efficiency and innovative in design and location. Retail real estate must leverage technology to drive the customer experience and complement online channels. Hospitality must cater to guests with more personalized services and reinvent offerings.

The COVID-19 pandemic presents both the public and private sectors with the opportunity to accelerate the transition to deliver real estate of the future. This section outlines key actions relevant stakeholder groups can take in relation to the Framework.

Private sector

Enabler	Pillars				
	Liveability	Sustainability	Resilience	Affordability	Cross-pillar
Digitalization and innovation					
Invest in research and development					●
Hire and train staff to ensure the proper technical knowledge exists in-house, especially at the leadership level					●
Assess organizational structures to ensure they reflect successful technology-driven organizations with dedicated departments and functions					●
Leverage technology to support sustainability goals; digitalization can help provide transparency in emissions and enable the successful delivery of targets set in the Paris Agreement, the European Green Deal and other net zero carbon ambitions		●			
Develop a clear business case around technology to drive investment					●
Regulatory framework					
Collaborate with the public sector to ensure policy is implementable and subsidy drives intended action		●		●	
Talent and knowledge					
Dedicate senior-level executives to roles focused on digitalization, resilience and sustainability					●
Commit to improving diversity, especially in leadership roles					●

Private sector

Enabler	Pillars				
	Liveability	Sustainability	Resilience	Affordability	Cross-pillar
Value-proof					
Develop clear business cases for technology, sustainability and resilience investments					●
Improve transparency to ensure all stakeholders have ready access to high-quality market data and performance benchmarks to monitor achievements in relation to liveability, sustainability, resilience and affordability					●
Commit to ESG criteria at both the asset and company levels to accelerate initiatives and investments across the real estate value chain		●		●	
Stakeholder engagement					
Promote deeper landlord–tenant collaboration to optimize design and use of space, share risks and provide adequate flexibility and needed amenities and services					●
Ensure closer collaboration with the investment and financial services industries, the public sector, academia and civil society; this is especially essential with regard to meeting ESG criteria					●
Secure local community engagement and the provision of clear community benefits from large developments					●
Support policy goals through investment partnerships				●	
Work across the value chain to align interests and reward project outcomes; individual interests should be aligned to jointly mitigate risks and share project benefits					●

Public sector

Enabler	Pillars				
	Liveability	Sustainability	Resilience	Affordability	Cross-pillar
Digitalization and innovation					
Commit to digitalizing public assets, including both buildings and infrastructure along with services					●
Regulatory framework					
Implement renovation programmes to help address existing building stock that is inefficient and uninhabitable, helping to create jobs and drive recovery					●
Adjust zoning to meet changing demand drivers and ensure equity and inclusion, allowing for more density, mixed-use development, community and open space, and the repurposing of assets					●
Support the delivery of sustainability by adapting procurement models to achieve sustainability goals in public assets and incorporating best practices into city development plans and building codes		●			
Support the delivery of affordable housing with policy instruments that allow for land acquisition and use public land for development; ensure subsidies and regulation do not hamper supply and maximize private investment				●	
Talent and knowledge					
Hire and equip employees with knowledge and skills for the Fourth Industrial Revolution					●
Value-proof					
Ensure the bankability of public projects to drive private investment				●	
Stakeholder engagement					
Ensure local, state and federal-level collaboration					●
Increase community engagement to understand citizens' needs and ensure successful project delivery					●
Increase private-sector partnerships to ensure legislation and subsidies deliver intended outcomes		●		●	

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