

Horizons

Issue 2 / 2021

Investment
Design
Operation

Building a sustainable ecosystem for real estate



In association with



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Savills plc

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Finance

Sustainable investment

Reorientating investment for stable healthy growth

Heavy debt load needs to be lightened

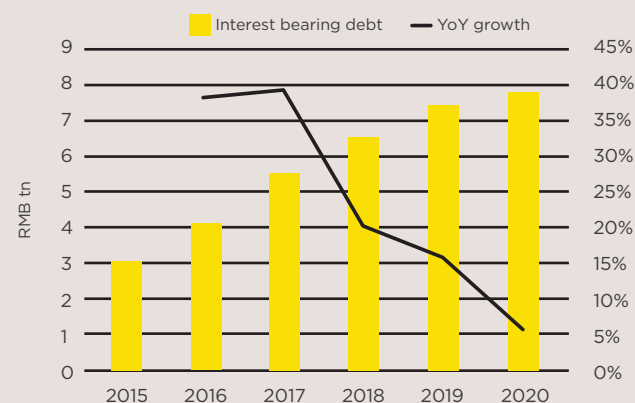
Real estate is a capital-intensive industry. In China, speculative, often unsecured, development has been heavily financed by bank loans, pre-sales and, in more recent years, bonds, securities and private debt financing. As market conditions slow, developer debt levels rise, and investors reduce their market exposure, the chance of a debt crunch starting in the real estate sector and spreading into the financial sector presents a real risk to stability.

Chinese authorities, in an attempt to rein in countrywide debt levels, implemented a financial de-risking campaign in 2017, including a crackdown on shadow banking. Then, starting in 2020, the government implemented guidelines on developer financing levels and their ability to issue new debt if these levels exceed pre-determined levels (the “three red lines”) as well as setting limits to banks’ exposure to the real estate debt market and sources of financing for new site acquisitions.

The real estate market, however, remains an important driver of economic growth, an important store of wealth, a significant employer, and a major source of government revenues. It is therefore imperative to ensure confidence and stability in the sector while also finding a more sustainable path forward.

REITs provide developers with a new source of capital from institutional investors and public investors while also limiting the minimal amount of leverage (20% of gross asset value). When China expands the scope of REITs to include other commercial asset types, it can help developers pay down debt levels to more sustainable levels, reducing interest rates and debt servicing costs. If developers already have manageable debt levels, it will enable them to recycle capital into new projects and make long-term strategic investments.

Figure 1: Top 99 Chinese Developer Total Liability with Interest Amount and Growth Rate



Source: CRIC, Savills Research

REITs

C-REITs - Far more than RMB30 billion

Real estate investment trusts (REITs) are an important source of long-term investment capital in many markets around the world. REITs bring with them increased liquidity, stability and transparency to the real estate and capital markets. China has long been exploring possible ways to launch its own REITs based on its unique political, financial and taxation situations by launching ABS, CMBS and Quasi-REITs over the years. However, these are mostly debt products in nature. China eventually issued its own REITs (initially focused on infrastructure projects) in June 2021 with the launch of nine C-REITs on the Shanghai (SSE) and Shenzhen (SZSE) stock exchanges. While there are still some limitations compared with REITs in other more mature markets, this is a significant milestone for China’s capital and real estate markets, and it could have a profound impact on the market in the long run.

To ensure the smooth and successful launch of C-REITs, authorities have carefully selected REIT applications whose underlying assets can generate stable and attractive income streams and are aligned with long-term investment horizons as well as bringing capital and benefits to bear upon areas actively supported by the government. Currently, the underlying assets are restricted to infrastructure, including the concession rights for toll roads, waste and water treatment, as well as business parks and warehouses. But as authorities, sponsors and investors become more comfortable with this new investment product, additional asset types could become eligible in the near future. In fact, not soon after the initial launch of C-REITs, the National Development and Reform Commission (NDRC) refined guidelines to allow

Table 1: First Batch of C-REITs

Project name	Fund manager	Underlying assets	Land use / concession right	Fund tenure (year)	Asset valuation (RMB mn)
GLP Logistics REIT	CICC Fund	Warehouse	Land use right	50	53.5
Yantian Port Logistics REIT	Hotland Innovation AM	Warehouse	Land use right	36	17.0
CMSK IndPark REIT	Bosera Fund	Industrial Park	Land use right	50	25.3
Suzhou IndPark REIT	Soochow Fund	Industrial Park	Land use right	40	33.5
Zhangjiang Everbright Park REIT	Hua’an Fund	Industrial Park	Land use right	20	14.7
Huhangyong Expressway REIT	Zheshang Securities AM	Toll Road	Concession right	20	45.6
Guangjiao Expressway REIT	Ping An Fund	Toll Road	Concession right	99	96.7
AVIC Shougang REIT	AVIC Fund	Solid Waste	Concession right	21	12.5
Capital Water REIT	Fullgoal Fund	Water Treatment	Concession right	26	17.5

Source: CSRC; HK; SSE; SZSE; Savills Research

for certain types of rental housing to be included as eligible future asset types in the future.

C-REITs were well received by both institutional buyers and retail investors, though all C-REITs require sponsors and strategic investors to hold high levels of equity within the structure (only 4-13% was made available to retail investors). Six of the nine REITs were priced at a premium to their valuations, led by GLP Logistics REIT (9% premium). The tranches offered to the retail investors were 15 times oversubscribed on the first day of offering.

China has been missing a long-term investment tool that has a limited risk exposure and also provides returns higher than treasury bonds (2yr treasury: 2.43%; 2yr fixed-term deposit: 2.1%).

Long-term exposure yet still liquid

The rapid price growth that has come to be associated with the Chinese real estate

market seems to be coming to an end. Gone are the days when investors could meet investment hurdles by relying upon rising rents and cap rate compression. Investors need to extend their investment horizon while focusing on proactive asset management and project enhancements to increase rental income and asset value over the long run. At the same time, REITs enable sponsors (typically developers) to retain partial ownership properties for a long term without losing the decision and management right while also freeing up capital that can pay down debt or be invested elsewhere.

While many other nations continue to grapple with the fallout from COVID-19 and the long-term implications to the real estate market, China’s recovery has been swift, though occasionally disrupted by targeted lockdowns. Companies have returned to offices, and shoppers are back out in the streets. Key occupier segments of the commercial real estate sector are also recording steady expansion, whether that be the continuous opening and

expansion of the financial markets. China is investing in the development of native technologies in new economy industries and promoting advances in the life sciences sector, advanced and automated manufacturing and consumer products and services segments.

That leaves the tech sector. One of the fastest-growing economy segments over the last decade, the sector has witnessed a spate of new regulations over the last year, having a significant impact on sentiment and share prices. Nevertheless, the regulations are positive for the long run as they primarily look at reducing systemic risks and breaking up monopolies as well as better regulating data flow/silos. These policies benefit from ensuring greater stability, increasing competition while also making better use of data. Growth in these segments should provide a strong base of demand on which the commercial real estate market can continue to grow, creating a reliable stream of income for long-term investors.

Asset management become the key

The success of a REIT over the long term relies heavily on the quality of its asset managers to actively upgrade the quality and level of underlying assets, improve the efficiency and generate high operating income in order to pay out higher dividends, accrue capital value growth and, as a result, gain the long-term recognition and support from its investors.

A successful REIT asset management requires coordination and aligning the efforts of multiple stakeholders. By doing so, REITs can build a resilient and strong ecosystem where related parties can flourish. This process is fundamental to maximising value creation and achieving long-term business sustainability.

REIT managers are also more likely to make long-sighted decisions such as establishing well-rounded asset management teams that understand the asset class and properties intimately or expending capital in the short term to ensure future resilience and for longer-term dividends such as investing capital

to make the buildings “greener”. REITs also have the advantage of enabling retail investors to gain exposure to professionally managed real estate from a range of different asset classes as opposed to buying real estate directly.

REITs and listed companies are public companies and are therefore required to adhere to stricter disclosure and governance than private companies. REITs must provide investors with regular, detailed reports and greater scrutiny from shareholders.

More firms are also understanding that investors price development companies and investment managers differently given the different nature of income streams and risk profiles. For example, CapitalLand recently announced plans to split its business into real estate investment management business (CLIM), which will be listed as a new entity and its property development business, which will be taken private. By doing so, CLIM can sharpen its focus and transition to an asset-light and capital-efficient business and deliver better results to the investors.

Figure 2: Shanghai office capital index 2010Q1-2021Q2

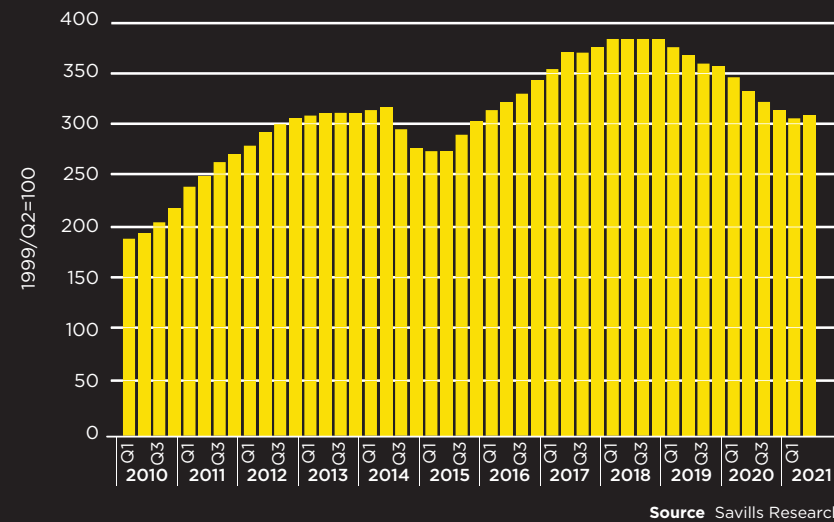


Figure 3: Key Components for REIT Management

- Acquisitions**
 - Target well-situated, high-quality developments
 - Targets must have stable income streams and future growth potential
 - Build robust portfolio to optimise investors returns and reduce volatility
 - Secure attractive pricing on acquisitions
- Asset management**
 - Pro-active management to improve operational efficiency and enhance returns
 - Preventive program and asset maintenance to ensure properties are in good condition
 - Asset enhancement to strengthen assets' competitive positions
- Credit & risk management**
 - Optimise capital structure
 - Calibrate equity/debt funding mix
 - Manage risk exposure
 - Ensure alignment of interest with different stake holders

Source: Savills Research

Food for thought

Green finance

The People's Bank of China announced in February 2021, the “three major functions and five pillars” (“三大职能”和“五大支柱”) for making green finance work for carbon neutrality.

Green bonds

Green bond issuance in China reached a peak in 2019 of US\$55.6 billion, of which US\$31.4 billion were aligned with international standards. These figures fell in 2020 in response to the pandemic and issuers holding off new issuances until there was greater clarity on new regulations and guidance on the market's direction. Q1/2021, however, saw this figure surge to US\$17 billion as the market regained momentum.

Green debt

From just 4% of outstanding loans at the end of 2018, the green loan market has greatly outstripped the wider market growing to RMB13.9 trillion by June 2021, accounting for 7.3% of loans. Green loans can only be used on environmental or social-impact projects.

Sustainability Linked Loans (SLLs), sustainability linked bonds (SLBs) and transition bonds

SLLs and SLBs, unlike green loans and bonds which designate a specific ESG-worthy project, require borrowers and issuers to set ESG-related targets and then pledge to pay a penalty if they fall short. In the case of loans, the loan margins fall if the borrower excels in their sustainability achievements. As a relatively new financing tool, they are gaining ground in overseas markets as a wider range of improvements can qualify. Transition bonds help companies in polluting sectors raise funds for projects that will help curb their environmental impact. Not only are financial institutions more likely to have a bigger quota for green and sustainability linked loans

and bonds in the future, ensuring a more reliable supply of financing, but they are also often come with much lower interest rates than traditional

loans, reducing the debt servicing burden for the heavily leveraged, capital intensive real estate sector.

Figure 4: Three Major Functions and Five Pillars

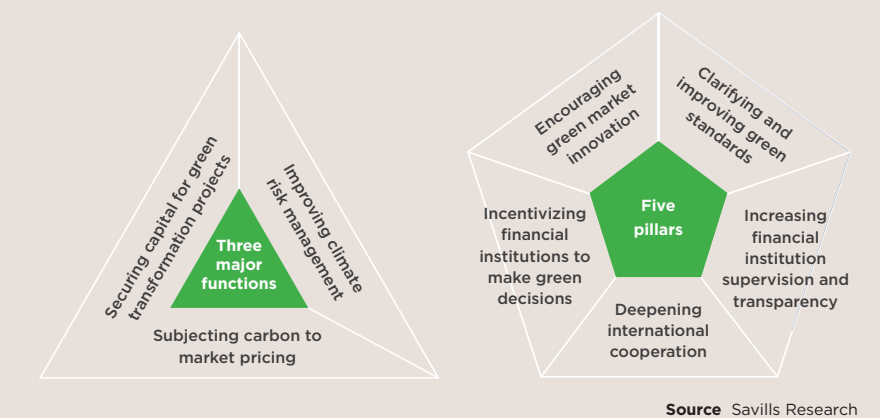


Figure 5: Volume of Chinese Green Bond Issuance

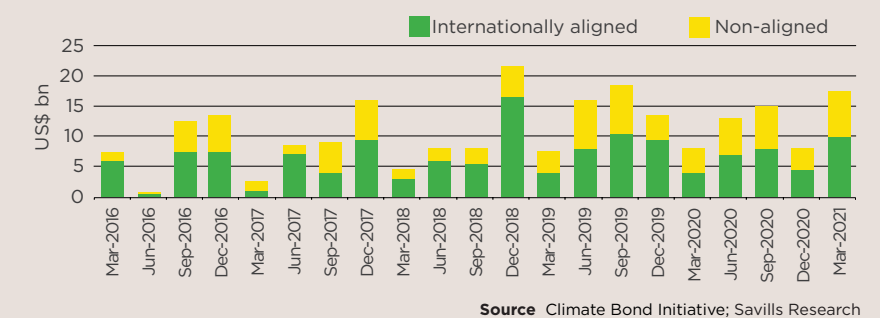
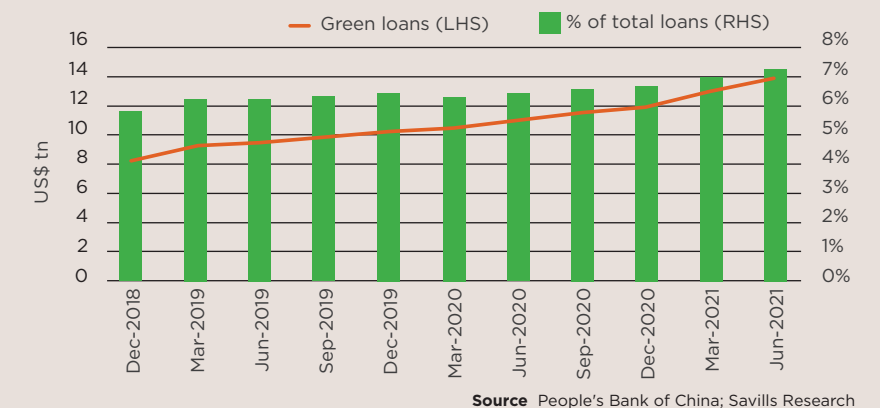


Figure 6: Green Loans in China



ESG reporting

More jurisdictions are requiring listed firms to disclose more Environmental, Social and Governance (ESG) metrics.

The Hong Kong Exchange (HKEX) first introduced the ESG reporting guide in 2012 for the voluntary disclosure of ESG information. The guide was revised in 2016 following a market consultation, and, in December 2019, the HKEX adopted enhancements to the existing ESG reporting regime.

The China Securities Regulatory Commission (CSRC) published the new disclosure rules for publicly traded businesses in June 2021, adding a new chapter on environmental and social responsibility, requiring companies to disclose pollutant emission situations, environmental impacts and administrative penalties arising from environmental issues. At the same time, the domestic exchanges are said to be in discussions with LSE on Carbon Emission Disclosures.

According to Carbon Footprint, Mandatory Carbon Reporting is the law in 40 countries across the world, including the UK, many EU member states, North America, Australia, Japan and soon-to-be South Africa.



Source World Resources Institute

ESG share performance

Very little meaningful action can be taken to address pressing climate change issues without the support and backing of the financial sector and corporate tenants. Corporations have long been seen as holding profit and shareholder value above all else are beginning to realise that investors' priorities are shifting, and corporate valuations are tied to more than just profits but also to the social good the firm is producing. This is reflected in the performance of various share price indices, which records a consistent outperformance of companies with high ESG performance relative to their sector peers, especially in recent years.

Greater disclosure requirements and the trend of ESG firms outperforming their peers will encourage companies to take a long look at their own sustainability monitoring and carbon footprint. For many firms in the services industry, a big contributor to Scope 1 and 2 carbon emissions could be their own office or retail space, new leases may move LEED/BREAM/Three Star certifications from the "nice to have" column to the "must have" column. Developers and landlords would do well to heed the shift in emphasis as they could start to see this playing out in occupancy rates and eventually rents in the near future.



Words: Sigrid Zialcita, CEO, APREA

Asia Pacific now accounts for 35% of global GDP – exceeding the share of the US and Europe – and has lifted millions out of poverty, but it is also responsible for about 80% of the world's coal consumption and up to 60% of CO2 emissions. The rate of economic development has no doubt come at an expense to the environment. While it could have been a trade-off in the past, this can no longer be the case.

The radical impact wrought by the pandemic globally has sparked a much-needed soul searching by governments and organisations. It has also exposed, despite tremendous economic strides, the vulnerabilities that the region continues to face. Environmental degradation has been linked as a cause for the outbreak, while the inability to suppress the human toll from infection surges has highlighted social divides.

Parallels drawn between the unforeseen risks of a pandemic and environmental issues, such as climate change, have served as a wake-up call and accelerated a rethink on the sustainability agenda and put ESG issues to the forefront. The Asian Development Bank (ADB) estimates that COVID-19 has plunged 75-80 million in the region into poverty—a stark reminder that without intervention, the region risks unwinding years of economic progress.

Global Epicentre of Real Assets

While the pandemic has disrupted growth trends in the region, the ongoing health crisis can still be considered just a blip against the backdrop of its long-term structural fundamentals—if it plays its cards right. The very drivers that have

ESG Geared for Growth in Asia

propelled the region as an engine of global growth can be harnessed and leveraged on, and building on the momentum from the pandemic recovery, spur the adoption of ESG agendas.

By 2030, seven of the world's 10 largest megacities will be in Asia Pacific. The region will be home to two-thirds of the world's middle class, and its urban population will expand by close to three billion. As the region becomes increasingly urbanised, its growing cities will require significant investments in real estate and infrastructure to build out its urban core.

In tandem with this trend, APREA expects the stock of investable real assets in the region to more than double by the end of 2030 to US\$40-45 trillion. Part of these will be driven by the region's infrastructure stock, which will need to increase by close to 92% by the end of the decade to keep up with projected economic growth. The ADB estimates that an additional US\$2 trillion will need to be invested by the end of the decade to address climate change.

Institutionalising Real Assets

The expansion of the region's listed real asset base represents a tremendous opportunity to engineer a green recovery. Securitized, listed vehicles are well placed to capture ESG opportunities. With an increasing proportion of assets held by such structures, it is clear that securitisation has a big role to play in the ESG equation and fulfilling sustainability objectives.

Aside from the accelerated digitalisation of economies, the pandemic has also catalysed the securitisation trend in the region. With the ability to recycle capital, REITs, in the wake of the pandemic, are a vital economic revival tool. Governments

are prioritising support, fast-tracking plans to establish the necessary framework. So far, the progress has been rapid.

With four debutants notched, the Philippines has emerged as the region's REIT IPO hotspot in 2021. China's highly anticipated REIT pilot program, which finally came to fruition in June with the listing of the country's first batch of nine infrastructure REITs, is a milestone for the region, while India's REIT and InVIT regimes, riding on the country's immense potential, will likely be in an extended cycle of growth.

Several bourses in the region have or are mandating sustainable reporting, introducing more transparency and compliance to sustainability policies and practices. The Singapore Exchange is seeking feedback on its proposal for listed companies to supply climate-related information and disclosure on board diversity as part of its regulatory compliance. REITs can be at the forefront of the industry's transformation. With an onus to continually undertake yield accretive investments through acquisitions or asset enhancements to sustain dividend payouts, REITs are incentivised to catalyse these changes.

Rise of Sustainability Investing

Sustainable investing is also taking off in Asia-Pacific as institutional investors accelerate their adoption of ESG criteria in allocating capital. Many investors are viewing the crisis as a clarion call for a different approach to investing. According to APREA's ESG Member Survey conducted earlier this year, 93% of respondents believe that proper ESG implementation has a role to play in their business.

The strength of inter-regional institutional capital in the region will be a force for change. Within the

region, its growing ranks of HNWIs, who are increasingly demanding socially responsible portfolios, will also be a crucial driver. The race to net-zero announced by countries in the region highlights how the policy landscape has turned.

MSCI notes that over the last three years, over 80% of sectors in each regional market have improved their overall ESG scores. China, currently the world's largest carbon emitter, has committed to turn carbon neutral by 2060. The country has already overtaken Japan to be Asia's largest green bond issuer and its place as the world's largest is likely just a matter of time.

Meanwhile, Singapore and Hong Kong have also recently announced plans to stake claims as the region's green finance hubs, a crucial cog in the ecosystem to incentivise ESG projects. Initiatives like these across the Asia Pacific will drive significant capital towards a lower-carbon economy. The ambitious targets no doubt presents significant opportunities for investors.

APREA forecast of stock of investable real assets in the AP region



The expansion of the region's listed real asset base represents a tremendous opportunity to engineer a green recovery. Securitized, listed vehicles are well placed to capture the opportunities from ESG tags. With an increasing proportion of assets held by such structures, it is clear that securitization has a big role to play in the ESG equation and fulfilling sustainability objectives.

Design & Construction

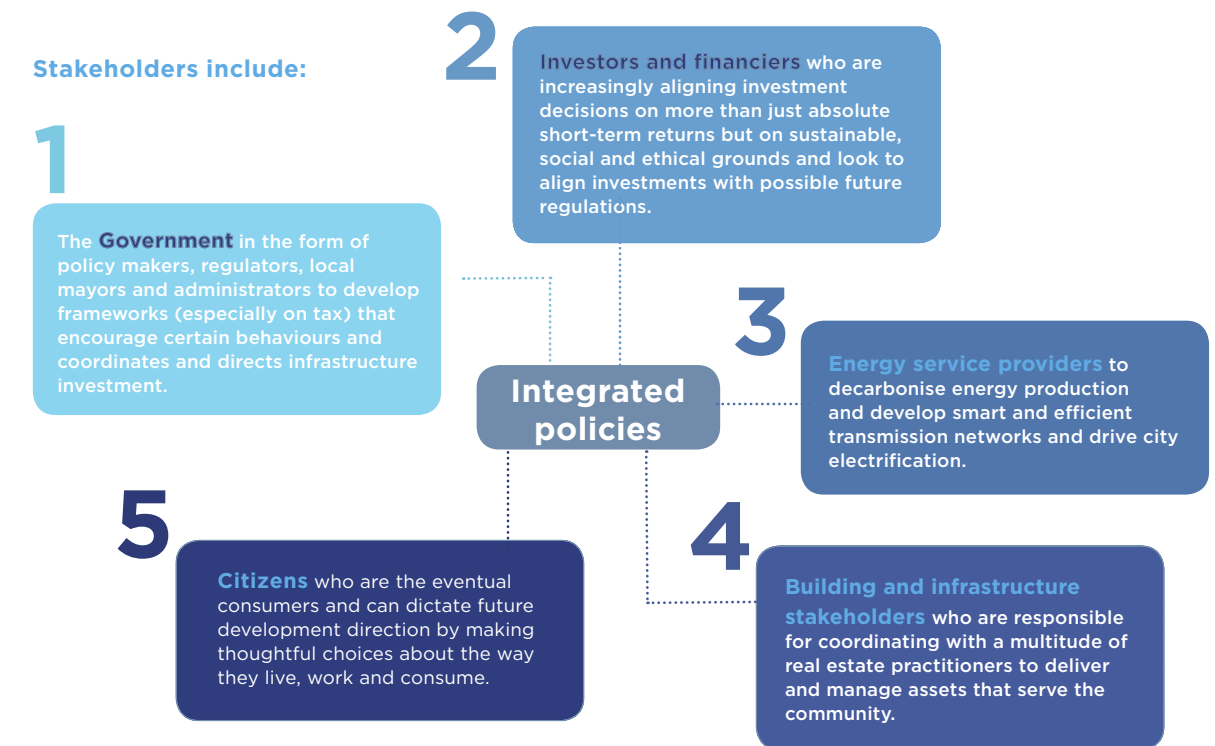


Future cities

Future cities will contribute to a sustainable/circular economy and will need to be smarter and safer as well as more resilient and adaptable. In order to achieve this goal, especially in a fragmented market such as the built environment, it is essential to have a top-down holistic approach which starts at the design stage and engages with all the key stakeholders then trickles down to the micro level.

Stakeholders

Given how the built environment is one largest stores of wealth in the world, touches all parts of society, the economy and business as well as being one the biggest contributors to GHG emissions, it is essential to bring a wide range of stakeholders together to develop a framework for future development.



Integrated energy systems in cities

In order to reach the goal of net-zero, three key principles need to be applied: one is to reduce carbon intensity in energy generation, second is to have a smarter/adaptable grid and third is reducing energy intensity (increasing energy efficiency) in the built environment.

Ultra-efficient Buildings

The vast majority of energy consumption in buildings comes from heating, cooling and lighting. It is essential to ensure adequate insulation while exploring opportunities

for district heat pump solutions and more efficient air conditioning systems and making full use of natural light. Buildings should also become more meshed with the electricity grid while also installing charging infrastructure in order to be able to better utilise distributed renewable energy sources generated by the likes of rooftop solar panels. Finally, it is essential to have a robust building management system to manage the more complex dynamic energy systems.

Smart energy infrastructure

Many cities energy infrastructure was designed decades ago with a centralise power system in mind that generated steady output. The shift to renewable energy systems and distributed energy generation requires a reworking of energy infrastructure that can accommodate for variations and disparities in generation, storage and consumption over time and geography. Generation of more data through smart metering and IoT devices is essential to enable dynamic control and potentially pricing to smooth demand fluctuations while also identifying bottle necks and highlighting areas for future investment, especially as more system become electric and grid capacity becomes stretched.

The grid should also allow for more charging locations as the energy grid become essential to a broader range of services (such as NEVs) while reminding the lifeblood of the city's day to day operation. At the same time, while a distributed network should prove more resilient, networks should also be hardened against natural or manmade disasters, with redundancy planning in place.

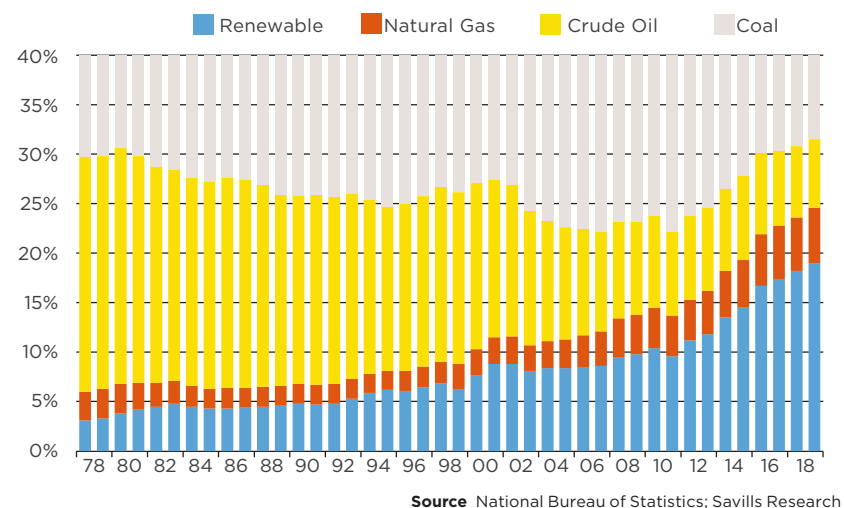
Clean electrification and decarbonisation

As more systems transition to electrification, it is essential the power generation becomes greener. The electrification of systems also has the benefit of unifying sectors and increasing compatibility, say for example allowing buildings and vehicles to draw and provide energy to each other as needed. At the same time the wholesale transition to electric as a single fuel source will remove duplication of equipment reducing construction and maintenance costs.

Compact cities

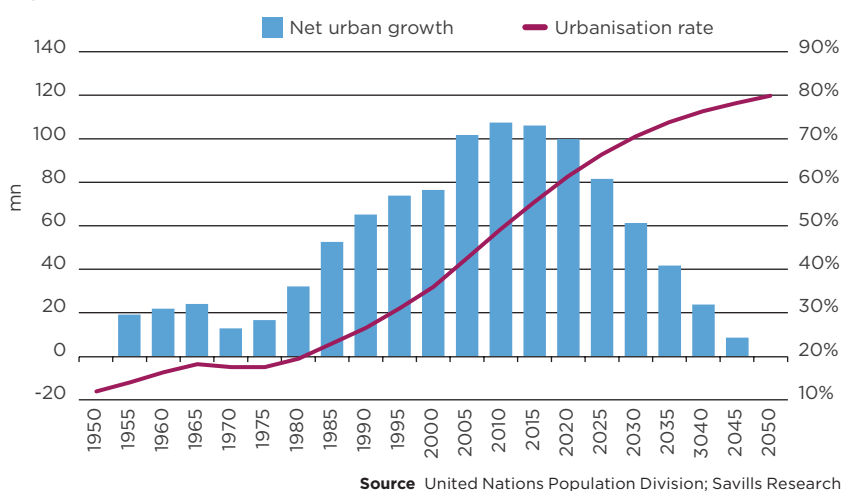
Developing the correct form for urban development is essential to developing a more sustainable society, underpinning the broader built environment but also businesses and communities. Efficient urban forms

Figure 7: China's renewable energy mix



Source National Bureau of Statistics; Savills Research

Figure 8: China's urbanisation



Source United Nations Population Division; Savills Research

can help to hasten the decarbonisation of a city's constituent parts.

It is of paramount importance that cities are designed with density at its core employing new urbanist principles of better land use, design, transport and housing. Correctly applied they can create compact, connected and clean cities which require less land materials and energy to create and run. Denser cities also have the benefit of higher returns on investment transportation networks and social infrastructure. At the same time compact cities are associated with higher levels of productivity and create greater social

good through the more effective investments in mobility infrastructure for lower income societies.

The 15- or 20- minute neighbourhood concept, such as those led by Paris and Melbourne, encourage walkability by ensuring daily essential resources and services (jobs, food, health, education and recreation) are never far away. Walkability, or indeed cycling distance, not only helps with the decarbonisation of transportation networks but is also positive for citizens' health while promoting a sense of belonging and engagement with a local community.

Smart cities

The pace of innovation continues to accelerate and as the digital first approach to business and digital nativism in society continue to gain pace in the post-Covid world, so does our physical environment. The built environment can either be dragged kicking and screaming into the new digital era with a piecemeal disjointed approach that lacks coordination and foresight and is prone to massive cost inefficiencies and uncountable vulnerabilities, or a framework can be initiated that has security, interoperability, sustainability, privacy, and equity at its core.

A recent report by the World Economic Forum and the G20 Global Smart Cities Alliance "Governing Smart Cities" outlines a policy roadmap which policymakers and technology providers can refer as a baseline for sound technology governance. The roadmap is organised around five core principles:

Equity, inclusivity and social impact

- ICT accessibility in public procurement
- Building accessibility standards into procurement to ensure digital-related services are accessible to those with disabilities

Privacy and transparency

- Privacy impact assessment
- Defining processes to assess privacy implications of new urban technology deployments

Security and resilience

- Accountability in cybersecurity
- Defining key accountability measures to be taken in order to protect the assets of cities and their citizens

Operational and financial sustainability

- Dig Once for digital infrastructure
- Setting out planning policies that improve coordination among city stakeholders and reduce the cost and complexity of digital infrastructure roll-out

Openness and interoperability

- Open data
- Developing a model policy for open data strategy in a city



Resilience & adaptability

Nobody can predict what the future will look like with any degree of certainty. Changes in society, industry, business and commerce will mean that cities will require different resources and services to be made available. Advances in technology will transform the nature of many interactions such as mobility while also generating additional data and insights into how people use space as well as making new applications possible. Outside forces such as extreme weather events will place new pressure on cities.

A balance needs to be struck between efficiency and resilience. When efficiency is the goal, every parameter is tweaked to extract additional value, though when outside forces disrupt the equilibrium the effect can be to throw the system into disarray. One recent example was the floods in Zhengzhou, there were reports that payment systems were down with store vendors unable to sell to shoppers that didn't have cash (the majority), ride hailing apps were down, hotel online booking, food delivery, online navigation, etc.

Food for thought

BIM & Digital Twins

A digital twin is a dynamic replica of a physical space that brings together design, construction, and real-time operational data. Digital twins simulate, predict, and inform decisions. Digital twins work by integrating a building's system, sensor, and utility meter data with intelligent multidimensional digital models. A true digital twin possesses the operational and behavioural awareness necessary to simulate, predict, and inform decisions based on real-world conditions.

Digital twins give multi-dimensional views into how an asset is designed and how it's performing, including occupant behaviour, use patterns, space utilisation, and traffic patterns. A digital twin offers a means to test "what-if" scenarios, including the impact of design changes, weather disruptions, and security events. It collects substantial data under one environment.

The ability to model the real world enables low-cost iterative design approach to challenging design problems by simulating the behaviour of any asset or group of assets in order to analyse it and improve its effectiveness. If artificial intelligence-aided design techniques are adopted to a set of desired outcomes and parameters and a point scoring system to assess possible designs, efficient and innovative approaches can be formulated.

Construction technology

An assessment conducted by McKinsey Global Institute in 2015 of 22 sectors across the U.S. economy assessing which were the most digital, identified the construction sector as one of the sectors which had seen the least digitisation of its business operations, just above agriculture and hunting. There remain significant opportunities for greater digitisation and subsequently efficiency gains.

Materials

The real estate sector is believed to contribute close to 40% of GHG emissions globally. Much focus has previously been placed on

the operational contributions, but increasing attention is now being paid to embodied carbon in the built environment sector. Platforms such as mindful Materials provide a free platform with aggregated information on human health and environmental impacts for products from leading manufacturers. Meanwhile leading international developers are beginning to club together to use their buying power to push suppliers to develop more sustainable products.

Not only looking at more sustainably produced materials but also recycling existing materials, the concept of green concrete, or the use of different building materials altogether such as cross-laminated timber (CLT) structures is starting to gain acceptance in some smaller scale projects.

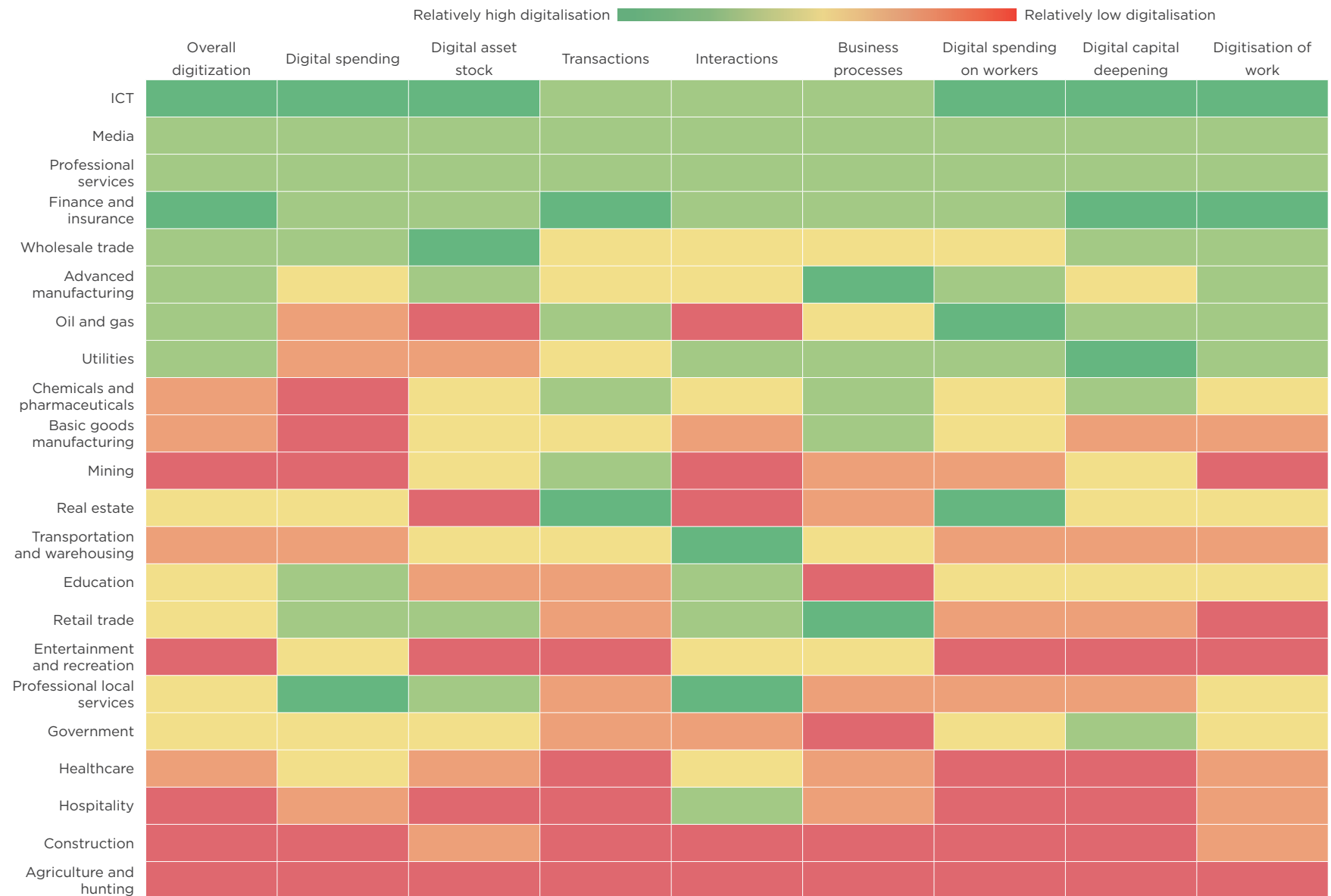
Circular economy

The circular economy is a concept reusing or recycling existing products as long as possible and thereby extending their life cycle and reducing waste to a minimum. This contrasts with the more traditional linear economy business which focuses on production but does not consider disposal of the item in the original product design. The circular economy principle is beginning to be applied to the built environment given the significant costs and embodied carbon of buildings. While the lifespan of a building may be 50-80 years; significant longer than a car, mobile phone or item of clothing; the building may have to undergo several refurbishments and project repositioning over that period of time and the eventual waste from decommissioning will be significant.

Incorporating circular economy thinking into building design and construction can:

- Unlock value in unused buildings and land
- Maximise residual value through recovery of and reuse of materials at refurbishment or demolition stage
- Improve asset life through building design and operation phase
- Enable repair, reuse and remanufacture

Figure 9: MGI industry digitalization index, 2015



Source
McKinsey Global Institute;
Savills Research

Modern methods of construction (MMC)

The use of MMC can help reduce the impact of construction, both embodied and operational. Traditional construction waste can account for around 20% of raw materials while offsite construction could be as little as 1%. In the controlled environment of a factory, production can be optimised to minimise waste. Additionally, modular construction means fewer deliveries to sites, cutting the carbon emitted from

transport. The buildings themselves are more efficient when completed often resulting in lower operational energy costs. MMC can also be assembled much faster.

MMC are slightly more expensive (roughly 10%) than traditional construction methods, nevertheless, building to net-zero carbon standards using MMC is much more competitive. As more orders come through the factories, economies of scale will further reduce the cost of MMC.

Transforming Cities through Low-carbon Design and TOD

SOM Words: Peter Duncan, Regional Practice Leader, SOM

Rapid urbanisation has led to many cities in China progressively introducing Transport Oriented Development (TOD) guidelines established with policy for comprehensive urban development and transport planning.

Whilst specific to each city these policies incorporate strategic aspirations and promote standards for:

- integrating transport systems and services
- establishing comprehensive plans and integrated development
- attracting investment and funding alternatives

Transforming our cities with design for low carbon livability will be achieved through carefully integrating multi transport modes within concentrated areas of development. It is however critical to adopt strategic principles of good TOD design within a range of appropriate development scales through urban design and establish commercially sustainable mixed use urban environments.



Compact development through increased density

Clustering density near transit stations provides accessibility to greater development area and population.

TOD must be compact and dense, promote walkability through maximizing convenience and proximity to regional mobility, whilst leveraging the high value of land surrounding transit stations.



Benefits through Good Design

Increased Economic Vitality and Land Value Capture

Transit stations connect to employment centres and commercial hubs, becoming gateways and important growth assets for a city. Various studies have identified an increase in residential and commercial property prices between 5-30% through proximity to transport. TOD can also maximize community benefits through access to open space, social amenities, and culture activities.

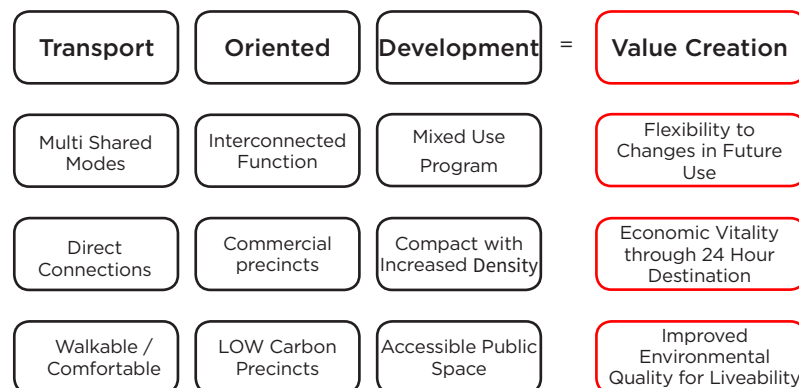
Improved Environmental Quality for Healthy Cities

Multi modal transport and TOD can reduce household greenhouse gas and carbon emissions by between 43-78% (Haas 2020) China's electrification of public and private transport has already demonstrated a significant reduction in NO₂ levels and carbon emissions, evident in major cities, which will progressively transform to low energy healthy cities in future.



Strategic imperatives for low carbon TOD

The strategic imperatives underpinning design for successful TOD are summarized below, highlighting aspects of value creation.



Establish multi modal transport connections

Access and mobility are essential elements to the efficient functioning of cities. TOD can establish efficient connection and comfortable transfer between multiple transport modes which link regional economies, reduce traffic congestion, air pollution, and enable healthy lifestyles. Combined with development these centers become important nodes of our cities.

Mixed land use for live/work communities

A balanced program of residential, commercial, employment, institutions, and civic uses contributes to a vibrant urban ecosystem supporting live/work communities. Programmatic diversity can be established through mixed land use which will also support social values in communities, housing affordability and provide for future demographic changes.

Future TOD and Low Carbon Urban Environments

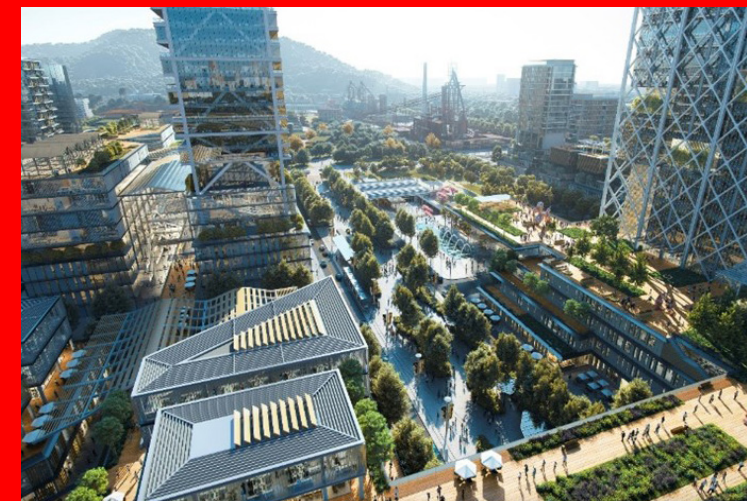
Integrating low carbon high performance standards through efficient transport and integrated development will underpin future comprehensive city planning and liveability of new urban environments. However, design strategies vary depending on the development intensity and transport catchment of a city or precinct scale demonstrated by the Xiong'an New City scale and Hangzhou's Hanggang urban transit neighbourhood designed by SOM.

Xiong'an New City Plan

Xiong'an represents the opportunity to become a worldwide leader in smarter urbanism, regional strategy, and environmental performance. Key design strategies include integrating intermodal transport throughout connected development precincts. Infrastructure is integral with the natural landscape.

Hangzhou Hanggang Metro TOD Plan

The new Hanggang Station will include multi-modal transit, and pedestrian-friendly public spaces to promote walkability within a low carbon precinct. Urban public space activates commercial development whilst guiding circulation connecting the various below grade transit lines.



Management & Operations

PropTech Powering performance progress

Fundraising for PropTech

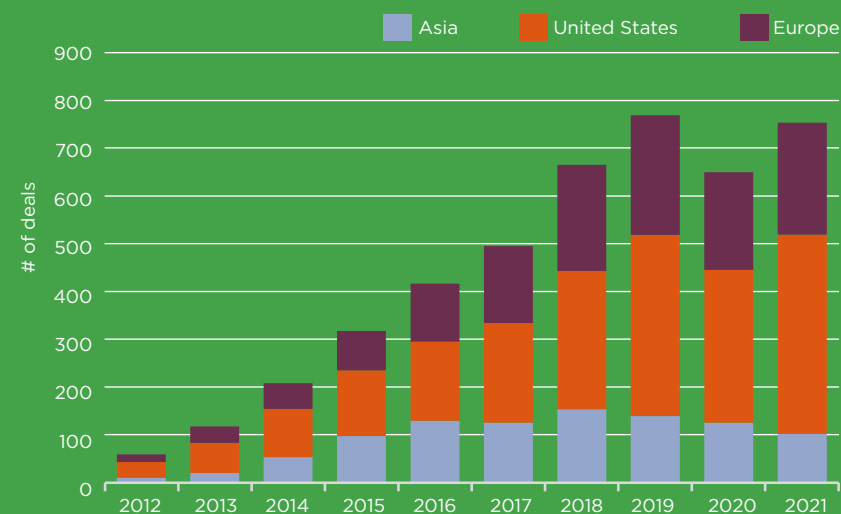
The PropTech sector has recorded steady growth over the last decade which it is expected to maintain and accelerate going forwards with the global real estate market size expected to grow from US\$487.6 billion in 2020 to US\$737.1 billion in 2025, according to PitchBook, a CAGR of 8.6%. 753 investment deals were concluded in the first eight months of 2021, with Asia accounting for just 102 of them. Nevertheless, the median deal size continued to grow, reaching US\$9.06 million vs. US\$10.77 million in the United States. Global capital raising slowed in 2020 due to economic disruption caused by the on-going pandemic but saw renewed growth in 2021. The pandemic and changes in business operations and human behaviour have forced real estate companies to rethink their digital strategies. A recent Deloitte survey¹ showed that 82% of respondents believed the pandemic exposed shortcomings in their organisations' digital capabilities, and many companies plan to accelerate digital transformation.

Crunchbase data corroborates similar trends while also indicating that tech companies specifically focusing on property management were able to raise US\$2 billion for the first seven months

of 2021. The Urban Land Institute (ULI) has also recently issued a global report which explores the extent to which PropTech has been adopted over the last three years and the breadth of current range of PropTech applications and their impact on business functions as well as the plans for the future. The survey covered several different PropTech sectors, from space use design to raising capital, but when specifically looking at property management technologies, 94% of companies indicated an overall positive impact on operations and services, 82% thought there was a positive impact on finances and 80% thought there was a positive impact on decision making, some of the highest out of any of the sectors.

¹ (Deloitte) 2021 commercial real estate outlook

Figure 10: Global PropTech Venture Capital Deals



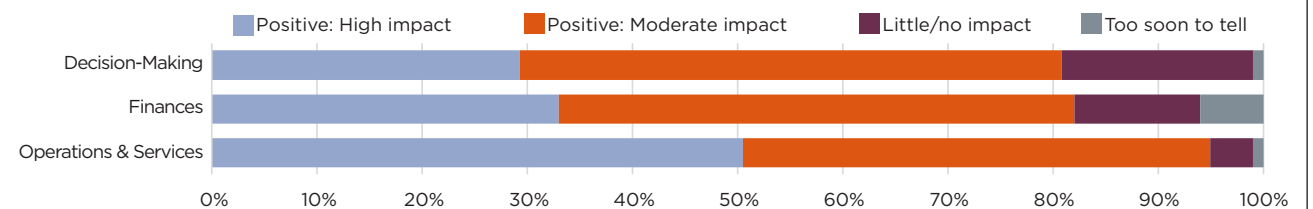
Source Pitchbook; Savills Research

China's adoption of PropTech in the property management sector would seem to be more pervasive though this maybe be because much of the technology is client facing. At home, this is largely due to the increasing popularity of Xiaomi, which produces a wide range of low-cost, aesthetically-pleasing smart devices, from security cameras to motion-detecting night lights. In a commercial setting, more office buildings have adopted facial recognition access control where tenants and visitors often have to pre-register themselves via WeChat or SMS and are only allowed access to designated floors. Service robots are also increasingly

common in shopping malls, hotels, restaurants, business parks, airports and train stations, either on security patrols, delivering parcels, providing directions or disinfect areas.

The high visibility of PropTech in daily lives is also a result of major Chinese internet companies' involvement in the sector, such as Alibaba, Tencent and ByteDance. These firms prioritise engagement rates and, as they enter real-estate related businesses, they apply similar metrics, looking to capture attention.

Figure 11: The impact of PropTech applications



Source ULI; Savills Research

Contributing to Sustainability

Wider adoption of PropTech, especially in existing buildings, will help the sector achieve net-zero emissions. Asset managers, in addition to adopting solutions such as installing solar panels on rooftops, need to also install sensors and controls to improve energy usage and efficiency, automate temperature, make lighting adjustment and other functions. More substantial energy gains can be realised when existing developments become obsolete and require more extensive renovation or repurposing.

Many countries are targeting for greener electricity production, with China's target set at 85% by 2060. Some analysts have argued that building operations will therefore become net-zero as long as they electrify and buy green energy from

the grid. This, however, ignores the fact that renewable energy mix goals are only achievable if business and society reduces energy intensity simultaneously. Landlords must work with tenants to ensure all stakeholders work together to achieve their common goal.

Green leases are one way in which this coordination is playing out. Green leases incorporate clauses whereby the owner and the occupier undertake specific responsibilities/obligations with regards to the sustainable operation/occupation of a property. The concept typically includes standardising efficient building operations which can be achieved through actions such as incorporating minimum sustainability standards for fit-outs and requiring submetering of tenant spaces. Thus, transparency is a key element in which PropTech can help. The applications of sensors

and data platform enables real-time data sharing between tenants and landlords. With real-time feedback, tenants can understand how their behaviour changes electricity usage and adjust accordingly. Other less financially orientated measures can also be instituted. For example, benchmarking tenants in a building compared to the peers, making sure tenants and employees are more aware of the impact their actions have on their carbon footprint as well as setting up closed loop feedback systems for certain functions.

PropTech also comes in handy for property management companies, especially in existing buildings. With detailed data collected in real time, bad management practices can be discovered, and a small tweak can reap huge rewards in reducing energy consumption and lowering management costs.

Figure 12: Property Management Market PropTech Map



Source Savills Research

Challenges

There is a consensus within the real estate community that much needs to be done during the operation of a building to achieve broader sustainability goals. An oft-cited challenge is the upfront costs and long payback periods. However, as costs fall and efficacy and efficiency rates increase, this is becoming less of an issue, though convincing owners can be a different issue.

Fragmented services providers and compatibility

Building operations is a complicated matter involving several complicated systems such as HVAC, lighting, water, gas, elevators and parking. Traditionally, each of them were supplied, installed, and managed separately. As new PropTech solutions emerge to manage individual systems, the complexity multiplies as interoperability becomes a real

issue given the different naming conventions, API standards and data formats. Public or private sector initiatives to develop data-standardisation standards and frameworks are critical to accelerate the adoption and scaling up of PropTech. In the case of PropTech, the whole is nearly always greater than the sum of the parts.

Fragmented ownership

Roll out of systems can also be a lengthy process, not necessarily in the installation of the systems, which in some cases can be done with a light touch, but in terms of educating fragmented ownership about the benefits of the systems as well as the customisation of platforms to unique building structures, asset classes, use types, regulations and environments. Even Blackstone, arguably the biggest real estate owner in the world with close to US\$300-400 bn under

management, is a drop in the ocean compared to the estimated global real estate market at US\$280 trillion. Even these large landlords will find it difficult to roll out a unified PropTech strategy across large portfolios.

Skills gap

The PropTech industry is still in the proof-of-concept stage, and there remains a large skills and knowledge gap between the IT and real estate industries. A global survey done by KPMG in 2019 revealed that 65% of people leading digital transformation at real estate companies do not have a background in digital technology outside the industry. This is echoed by an EY report where 53% of survey respondents admit they do not have the required tech talent. It is vital for real estate companies to start upskilling their workforce and implementing policies that foster a culture of innovation.

Super Apps supercharge the race

China's tech sector has developed in relative isolation from the rest of the world, creating several domestic champions, such as Tencent and Alibaba, that have flourished in the light-touch approach to regulation that has existed until recent years. These firms have evolved in distinctive ways creating unique business models and ecosystems.

WeChat is omnipresent, with more than one billion active users in China and 1.24 billion worldwide. Users come from all walks of society; indeed, Daxue Consulting's 2020 analysis shows that the age of WeChat users is a relative representative of China's population. This is not surprising as tools such as Alipay and WeChat Pay have largely replaced conventional payment methods. At the same time Health QR Codes developed in response to the pandemic and hosted by WeChat or Alipay are now often required for access to public venues.

However, what has really been a game changer was the introduction of mini programs in 2017, which allowed third parties to create lightweight programs which sit within WeChat's ecosystem. The easy-to-develop mini programs do not require users to download them but offer a smooth user experience. Figures from Daxue Consulting indicate that, as of June 2020, six out of ten WeChat users use mini program on a regular basis. Additionally, the integration with WeChat Pay and WeCom (the enterprise version of WeChat) and other back-end systems has encouraged more companies to more closely link their systems with those of WeChat and its mini programs.

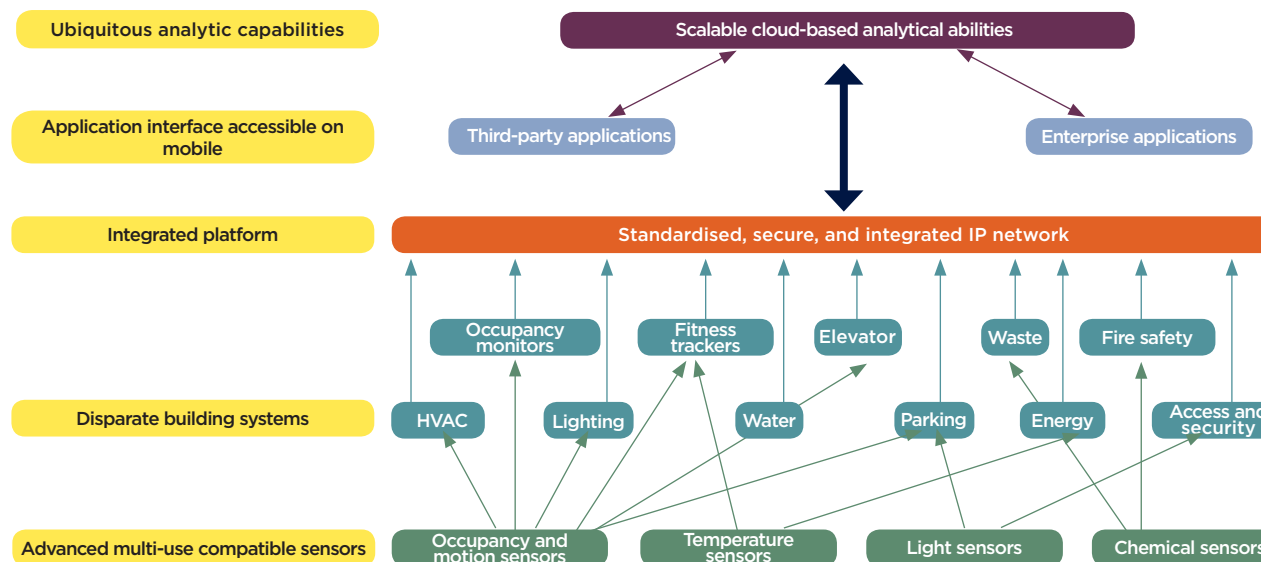
Having established strong footholds in the retail, finance, media and communication sectors, tech firms are turning their attention to one of China's largest industries and employers which is prime for tech disruption, namely the property sector, bringing with them their extensive knowledge about consumer engagement, behaviour and preferences. However, the property sector has its own unique challenges, namely the

intuitional resistance to change, large number of stakeholders and users and its fragmented ownership and management.

A company which monitors and adjusts HVAC systems and lighting usage in an office building is providing services to the landlord, property manager, corporate tenant and employees, all at the same time. The PropTech firm has to ensure compatibility, communication and a weighing of different priorities to ensure successful adoption. Tech platforms have the advantage of already being ubiquitous and having developed a robust understanding of user engagements.

By collecting data of users' preference and behaviour, property management companies can recommend services and products at times of peak engagement with the help of AI. Combining this advantage with the local tech companies' strength in moving fast, adding new service verticals, and improving existing services at breakneck speed, PropTech in China have been able to keep its users interested so far.

Figure 13: IoT information value stack for Commercial buildings



Source BIOT-BUILDING Internet of Things; Deloitte Centre for Financial Services analysis

Food for thought

Retrofitting

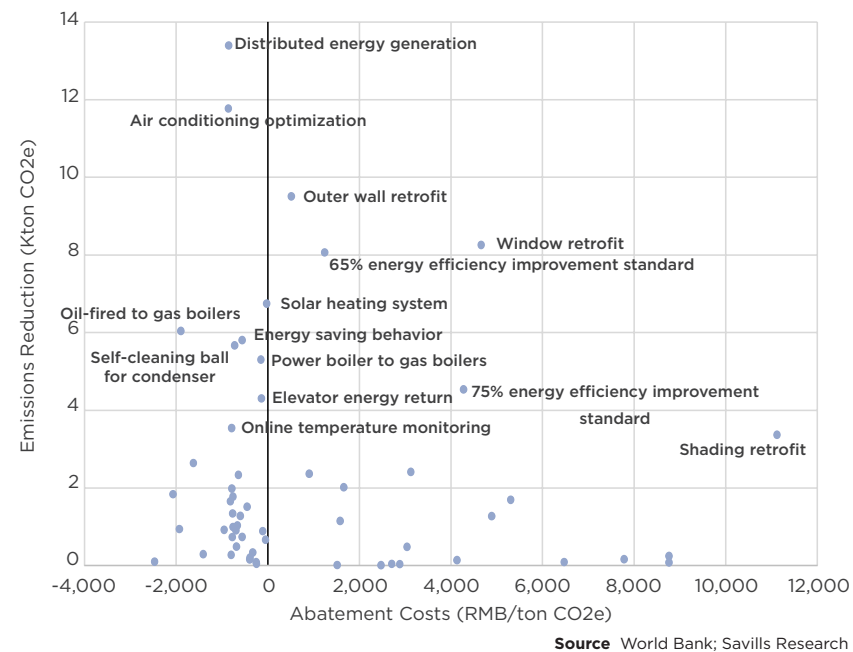
While the opportunities to develop more sustainable buildings are easier and more cost-effective to realise in new builds, the sheer scale of existing stock means that in order to achieve significant GHG emission savings, renovation or retrofitting will need to take place. Full-scale renovation is costly and will often only happen once a building is no longer fit for purpose. Landlords and property managers are constantly fixing of replacing components of a building and it is essential that through regular maintenance that replacement systems are chosen for their energy efficiency and sustainability.

The World Bank carried out an analysis of Changning in 2013 where it identified possible cost-effective, low-carbon investments. The study looked at 58 abatement measures looking their cost of abatement per ton CO₂e and their potential contribution emissions reductions, helping to identify the low hanging fruit. Of the measures identified, nine measures that had a negative abatement cost, while still having a significant impact on emissions reductions, namely air conditioning optimisation, solar heating system, oil-fired to gas boilers, energy saving behaviour, self-cleaning ball for condenser, power boiler to gas boilers, elevator energy return, online temperature monitoring and membrane for light boxes.

Stakeholder engagements

Real estate is believed to contribute roughly 39-40% of global energy related carbon emissions, with operational emissions accounting for 28% and embodied emissions at roughly 11-12%. While it is the real estate industry's manufacturers, planners, designers, construction firms and developers' responsibility for embodied carbon, it is the broader community's responsibility when it comes to operational carbon emissions as we are all users of the built environment in some form or another.

Figure 14: Abatement assessment for Hongqiao Area, 2015



Monitoring

Underpinning all efforts, however, is access to good quality data in order to benchmark against peers and historical performance to access ESG financing and investment and assess areas for potential improvement and the impact of certain changes in operations or to create feedback loops into subsystems. The arrival of 5G, advances in technology as well as the maturing of artificial intelligence/machine learning has made deployment simpler, faster and cheaper. The challenge now rests with educating landlords, data security and staff to know what to do with the wealth of information.

Occupier Reporting

Companies are already being required to do this in many countries, with typical emissions being broken down into three key groups called Scope 1, 2 and 3. Scope 1 (Direct emissions) refers to direct emissions of greenhouse gases through things such as burning of fuels and use of petrol cars. Scope 2 (indirect emissions

– owned) refers primarily to electrical consumption as well as steam, heating and cooling. Scope 3 (indirect emissions – not owned) is much more challenging and the largest contribution to emissions. It requires entities to understand upstream and downstream emissions related but not owned by their business.

Training/education

While owners can invest in infrastructure and systems can be set up to monitor and automate many aspects of a building which can also be refined over time, it is often the human element that can throw a spanner in the works, especially when systems are not accurately calibrated or human operators don't properly understand the systems. An oft-stated example is the idea somebody leaving a window open next to an air conditioning system on full blast. In order to ensure engagement and participation on common sustainability goals, it is essential that all occupants are involved in the process.

Operations and Management of WELL Certified Spaces



Words: Mei Xu, Vice President, IWBI Asia

Foreword

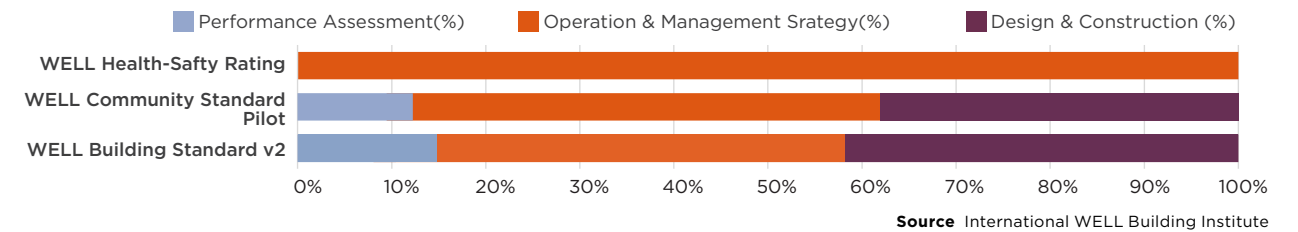
Over the past decade, people have come to recognise that healthy buildings are necessary for improving quality of life, implementing policies and promoting industry development¹. Compared with traditional buildings, healthy buildings are more focused on direct impacts on the health and well-being of the people inside the buildings. The WELL Building Standard™ (WELL™), backed by the latest scientific findings and the best

industry practices, does exactly this by advancing the health and well-being of people around the world. China has seen a robust uptake in market demand for WELL buildings in the wake a global pandemic since 2020.

Health risk factors in buildings can be effectively mitigated through operations and management². The International WELL Building Institute™ (IWBI™) is committed

to creating buildings that help people thrive through a holistic approach. While addressing the health aspects of design and construction strategies, the WELL ecosystem including the WELL Building Standard, WELL Community Standard and WELL Health-Safety Rating also pays a great deal of attention to performance testing and operations and management that can promote health outcomes.

Figure 15: Breakdown of focus areas among WELL programs



Operating a WELL Certified Space

The operation of a WELL space requires objective measurement of building performance through performance testing and continuous monitoring. It also entails user experience-based assessment such as occupant survey. Operation strategies and management policies that support human health and well-being are essential. Findings from such measurement and assessment are then used to guide any update and adjustment of operation and management strategies to sustain a healthier and high performing space.

Performance Assessment

The WELL Building Standard evaluates the actual performance of a building

space from both objective and subjective perspectives, respectively, performance testing and occupant surveys.

Performance Testing and Continuous Monitoring

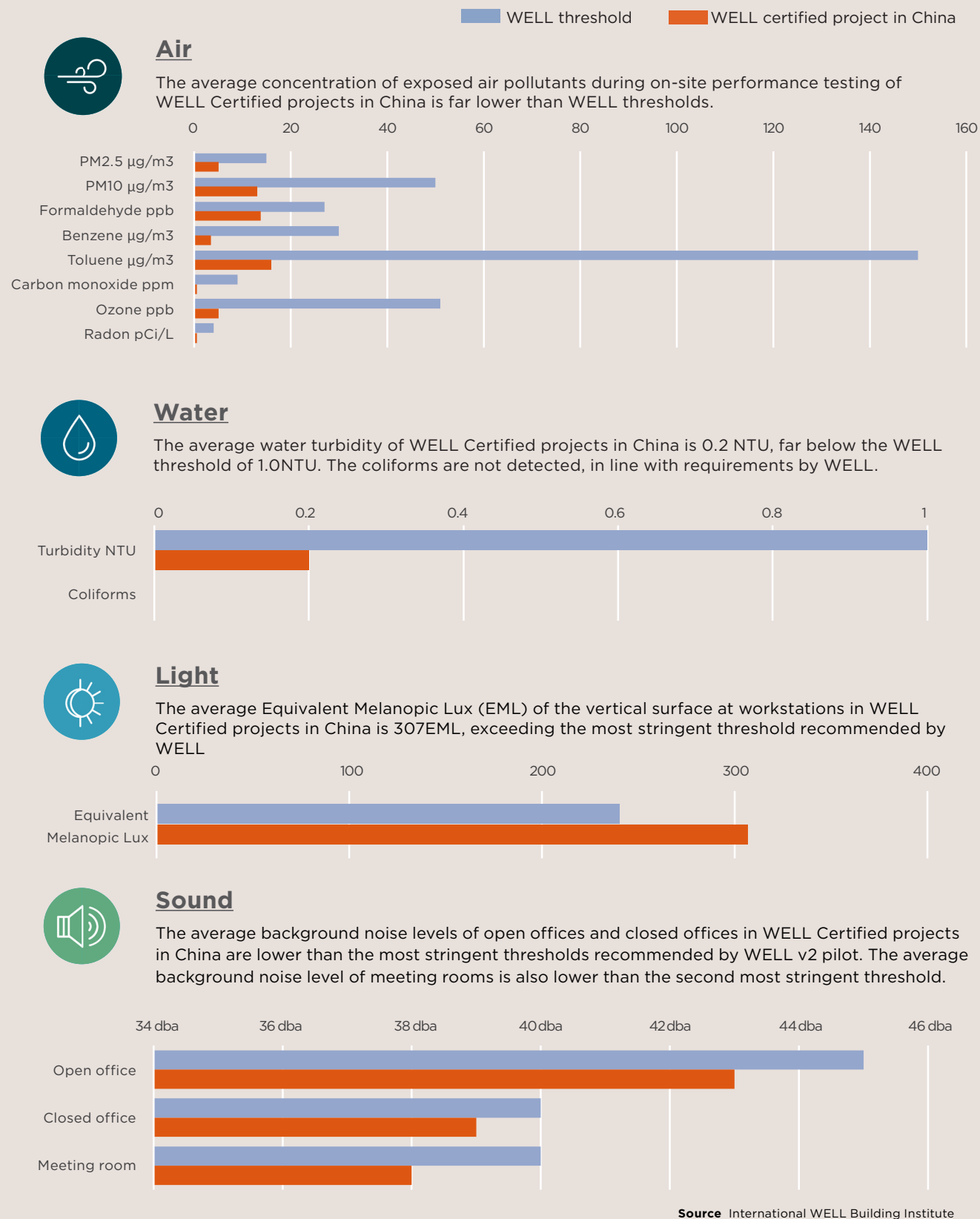
Performance testing and ongoing monitoring, a very important parts of the WELL Certification process, offer a best approach to objectively assessing the environmental performance of a space. The WELL Building Standard not only requires comprehensive testing of air, water, light, sound and thermal comfort by a third-party professional Performance Testing Agent upon project completion or occupation, but also requires continuous monitoring of indoor

environmental data throughout the operational phase, as well as a recertification every three years.

Occupant survey

When it comes to performance assessment, regular collection of feedbacks from building occupants — in addition to more objective data-based measurements — is considered an effective tool for understanding and assessing occupant satisfaction with the building performances, design, policies, operations and maintenance. Occupant surveys make it possible to track individual experience and satisfaction with the given space and provide valuable information for identifying and prioritising health interventions, addressing

Figure 16: Performance Testing Results of WELL projects in China (data is as of July 2021)



dissatisfaction factors and adjusting operations and management plans. This will translate into a healthier and more productive building space.

Operations and Management Strategies

The operation of a healthy space depends on strategies that fully support people's health and well-being. The strategies to operate and manage a healthy space including corporate well-being policies and facility operations protocols provide ongoing protection for the health of those who use the space. An increasing number of Chinese companies are developing workplace wellness programs for their employees. A combination of diverse health incentives and health awareness programs effectively enhance employees' health and well-being, with higher levels of satisfaction, happiness, and self-esteem^{3,4}. Studies show that for every \$1 invested in workplace wellness programs, medical and absenteeism costs have been reduced by approximately \$3.27 and \$2.73, respectively⁵. Successful workplace wellness programs have the potential to not only reduce medical costs and absenteeism, but also help to improve productivity, foster company culture and attract and retain talent.

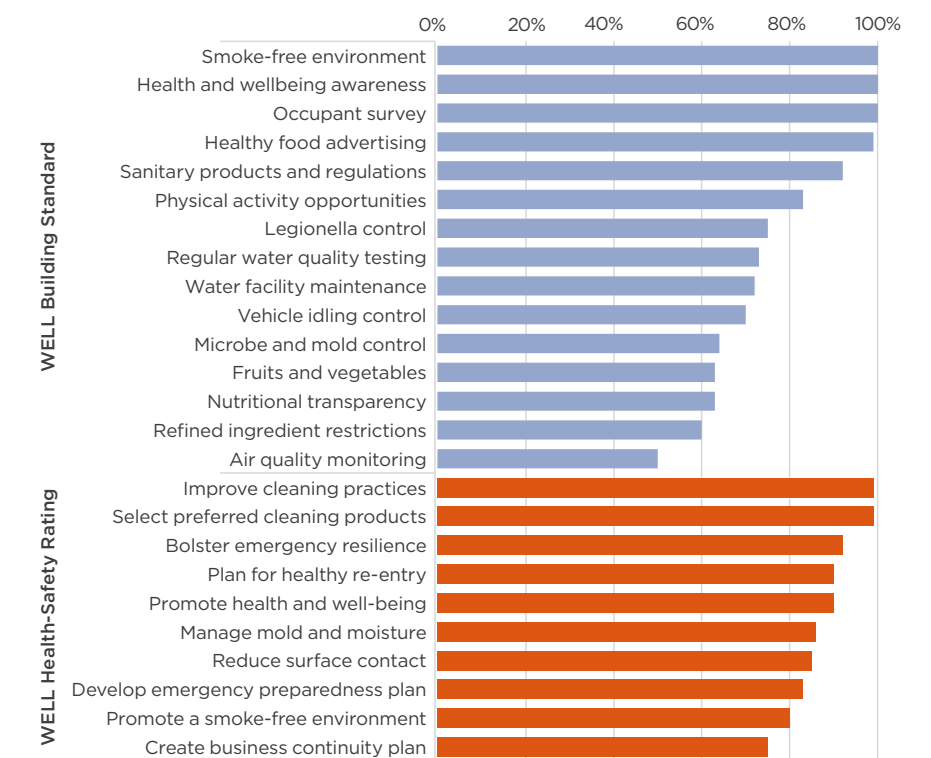
The operations and maintenance of facilities and equipment have a positive impact on the health and safety of the people in a built environment. WELL encourages project owners to make operational adjustments based on assessment results and findings of occupant surveys to improve facility performance. For example, the clause concerning drinking water quality management requires water quality tests to be conducted on a quarterly basis to help determine the maintenance needs of pipelines or water treatment facilities. The figure on the right shows the most popular WELL management strategies among projects in China.

Figure 17: Key Topics in WELL Feature C04 on Occupant Survey



Source: International WELL Building Institute

Figure 18: Most Popular Management Strategies among WELL projects in China



Source: International WELL Building Institute

Case Study: WELL Project Operation

Healthy people, buildings and environments are integral to a healthy economy. Broad adoption of the WELL Building Standard by projects can greatly contribute to a healthy economy. More companies in China are implementing healthy building initiatives, seeking to exercise pioneering leadership by adopting the WELL Building Standard focusing on performance verification and evidence-based operation strategies.

Covestro Shanghai office

"Covestro has been practicing corporate social responsibility, and we attach great importance to the health and well-being of our employees. We are eager to contribute to sustainable development and a circular economy with our material expertise. WELL Certification at the Gold level has helped to create a world-class, open, inclusive and flexible work environment for our employees and, in doing so, improve their health, well-being and satisfaction. Our staff survey shows consistent high scores on satisfaction — 97%, 99% and 100% for three years from 2019-2021."

Xiang Qing, Head of Corporate Communications APAC & Lead of Diversity and Inclusion APAC, Covestro

SHAW Shanghai Showroom

"Our showroom in Shanghai received the Silver-level WELL Certification in 2017. The reason we chose WELL Building Standard is that we were impressed by its people-oriented philosophy and practical approach, something we have in common. The people-oriented approach has always been one of the three pillars of Shaw Contract's competitiveness. The following three years' operation in line with WELL standard had a profound impact on the work and life of our employees, and our China business led the satisfaction rankings in 2020, according to a survey carried out by the International Division. Inspired by this, we registered our Shanghai showroom for another verification in 2021, which was the world's first case of WELL recertification and received an upgrade to the Platinum Level (WELL v2 Pilot). Within the four years of running the WELL Certified showroom, our China team have experienced and recognised the significance of a healthy environment. We have also continued practicing WELL's people-centred sustainability concept in work and life, which has enhanced the experience and perception of happiness for each individual, our team and families."

Nancy Cai, Regional Vice President, Greater China & Mongolia

Porsche China SPACE 4.0

Employees are the revving engine of a company, and their health and happiness are key to success. Thus, it is Porsche's corporate strategy to become the most attractive employer. In 2019, we unveiled our new China headquarters in Shanghai, which is the first Porsche property worldwide honoured with the WELL Certification at Gold level. With the guidance from IWBI, we have designed a work environment that enhances collaboration and engagement. The smiles of our workforce at the Porsche China SPACE 4.0 reassure us that we have chosen the right strategy for our future development."

Janice Tsang, Head of Innovation, Porsche China

Conclusion

While good design and construction can provide the structural foundation for health strategies in operations, it is the continuous optimisation of operation assessment and management that does the trick. A space that puts health and well-being at the heart of design and operations usually performs better at energy saving and emission reduction. Sustainable design and operation strategies, such as daylighting and ventilation, serve the dual purpose of planetary health and human health.

Urban development in China has gradually shifted its focus from incremental real estate development to existing stock redevelopment. Instead of viewing WELL Certification as a destination, more project owners now see their WELL achievement as an important milestone to kick off operation and management strategies that elevate people's health and well-being. IWBI will soon launch the WELL Performance Rating to enhance the experience of the people inside buildings by using measurable and validated building performance metrics. Sustainable management, which places human health and planetary health at the centre of operations and management, will go a long way in supporting people's health and well-being and help organisations to fulfil their environmental commitments throughout the building life cycle.

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