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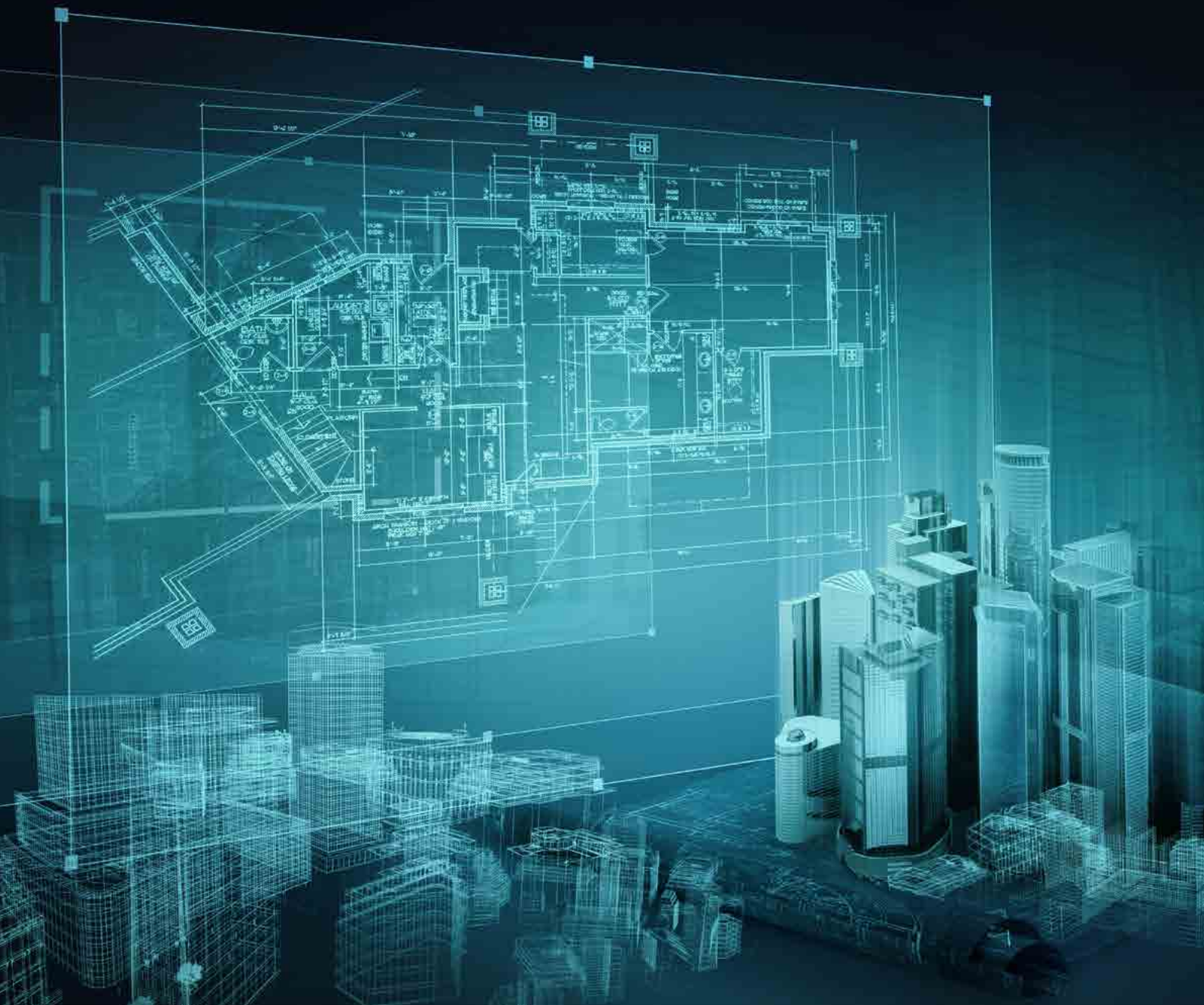
TACKLING COSTS IN THE DIGITAL AGE

INTERNATIONAL CONSTRUCTION COSTS 2018

ASIA VERSION

FOREWORD

The global economy is growing in 2018. Following a stronger-than-expected 2017, countries around the world are experiencing an upturn. Rates in excess of the long-term global average of 3.9 percent per annum can be expected over the next two to three years. This robust economic performance will accelerate the demand for construction around the world.

Huge opportunities will be created, with the United States, Europe and Asia likely to be notable hotspots for construction growth. Equally, this will place further pressure on construction costs, with certainty and value for the money remaining high on the agenda for clients everywhere.

The latest edition of Arcadis' International Construction Costs Report details and ranks the relative cost of construction in 50 of the world's leading cities.

Last year our theme was uncertainty, and we highlighted how complexity associated with geopolitical and macroeconomic events was impacting demand and cost dynamics around the world. We focused on how the associated risks can escalate costs and become a barrier to the successful delivery of project and program investment.

We emphasized that agility was an increasingly valuable capability that enables investors and developers to create flexible approaches to project procurement, finance and delivery. We also highlighted that access to high-quality data and market knowledge is fundamental, as markets continued to be buffeted by both unexpected events and shifts in the business cycle.

As the global market heats up, a continued focus on productivity and cost reduction is needed. With constrained capacity in many markets, the only way to deliver on global aspirations will be by doing things differently and delivering more with available resources.

Digital transformation offers construction clients everywhere a huge opportunity to be smarter and more creative and innovative. Leveraging digital technologies and data enable collaboration and integration across pre- and post-contract processes to drive efficiency and value. For the client, embracing digital transformation provides the opportunity for a higher-quality end product delivered in a more cost-efficient and timely manner.

Arcadis' work with construction clients shows that those who invest in digital technologies gain a sustainable competitive advantage. This factor is likely to become more pronounced as economies grow, especially in markets where demand for construction services exceeds the supply of skilled labor.

Andrew Beard

Global Head of Cost and Commercial Management

THE ARCADIS INTERNATIONAL CONSTRUCTION COST COMPARISON

This year we expanded and reconfigured the cities featured in our construction cost comparison in order to provide a spread of key construction markets around the world.

New to the comparison are eight cities in the United States and Toronto in Canada. These cities represent six of the top 10 cities in the ranking. Australia's Brisbane and Sydney, along with three cities in India, have also been added.

Hong Kong, London, Macau and Geneva all remain in the top 10, though they have moved down after being displaced by more expensive North American cities.

Some European cities that were previously in the top 10, including Stockholm, Copenhagen, Frankfurt and Paris have now fallen and sit in the top 20.

The relative strength of the U.S. dollar is a key factor influencing the positioning of cities in the index this year. The strong dollar places North American cities higher in the index compared to markets where the domestic currency is relatively weaker against the greenback.

Construction demand growth has also played a key role. Markets where demand is strong typically see price inflation, increasing the costs of construction for clients and investors.

China's One Belt, One Road project, one of the largest overseas investments ever launched by a single country, contributes significantly to global construction demand, with over $900 billion of planned projects, from gas pipelines in Central Asia to high-speed railways in Indonesia.

PRODUCTIVITY CHALLENGE

Aside from exchange rates and demand, the differences between the cities in the ranking are largely due to local management and specification norms, input cost levels and the mix of capital and labor intensity. However, underlying this diverse data, a critical common theme affecting construction industries everywhere often is overlooked – the challenge of poor productivity. Productivity challenges afflict construction everywhere, born out of in-situ construction methods, unique projects, transactional commercial models and labor dependency.

For the most expensive construction markets in the world, such as New York, Hong Kong and London, productivity challenges are reaching fever pitch. Severe skills shortages resulting from stubbornly high levels of labor dependency, combined with difficulties in recruiting and retaining the workforce, are firmly rooted and act as an inflationary factor.

Without significant improvement, the high cost of construction will continue to act as a drag on overall global competitiveness.

Some key markets, including Singapore and Hong Kong, are making strides in raising the proportion of pre-manufactured value in projects, including the use of modular construction.

For example, Singapore has made Prefabricated Prefinished Volumetric Construction mandatory on nearly half of all land sold by the government for development to increase productivity and lower construction costs.

Key technological advances such as robotics will change the game for construction in many markets and are close to significant breakthroughs. However, across the construction industry, progress has certainly been slower than in other industrial sectors around the world. The search is on for how to break construction's barriers to sustained long-term productivity.

More balanced workloads are likely to be key for improved productivity. Few would dispute that construction all over the world has a highly cyclical nature of workload, which cripples the ability to plan and invest for the long term.

DIGITAL VISION

Policy makers and clients providing solid commitment and early visibility to their construction pipelines would allow the supply chain to plan and make long-term investments, including those that could boost productivity.

ARCADIS DIGITAL INTEGRATION THROUGHOUT COST LIFE-CYCLE MODEL

For example, reliable order pipelines are essential if off-site manufacturing is to grow successfully given the scale of capital investment required.

Reliable order pipelines can also help support investment in innovative digital technologies.

In Sydney, long-term investment in public transport infrastructure to the tune of $75 billion over 10 years provides an example of such visibility. This enabled Arcadis and partners to use cutting-edge technology to speed up and improve the quality of the design process for the construction of the $11.5 - $12.5 billion Sydney Metro City & Southwest.

The design team created a system that included a customer avatar to test a range of end-user experiences. These avatars, known as Personas, provide human design reference points for the broader Virtual Reality, 3D visualization and immersive digital environment modeling that is used for testing design options. Feedback from this process informed the design, enabling enhanced customer outcomes.

The construction sector remains one of the least digitalized. But as the world enters a welcome phase of buoyant economic performance, digitalization presents an opportunity to help improve productivity levels in the industry.

"Digitalization in construction presents an opportunity to both help improve productivity and reduce cost. Achieving this by making processes more efficient is the typical example possibility of digitalization in construction, but the biggest prize will be for those who completely reinvent how things are fundamentally done."

Will Waller,
Arcadis,
Head of Futures

INTERNATIONAL CONSTRUCTION COST COMPARISON, LOCATION FACTOR INDEX

< Less costly to construct   Index Base: London =100   More costly to construct >
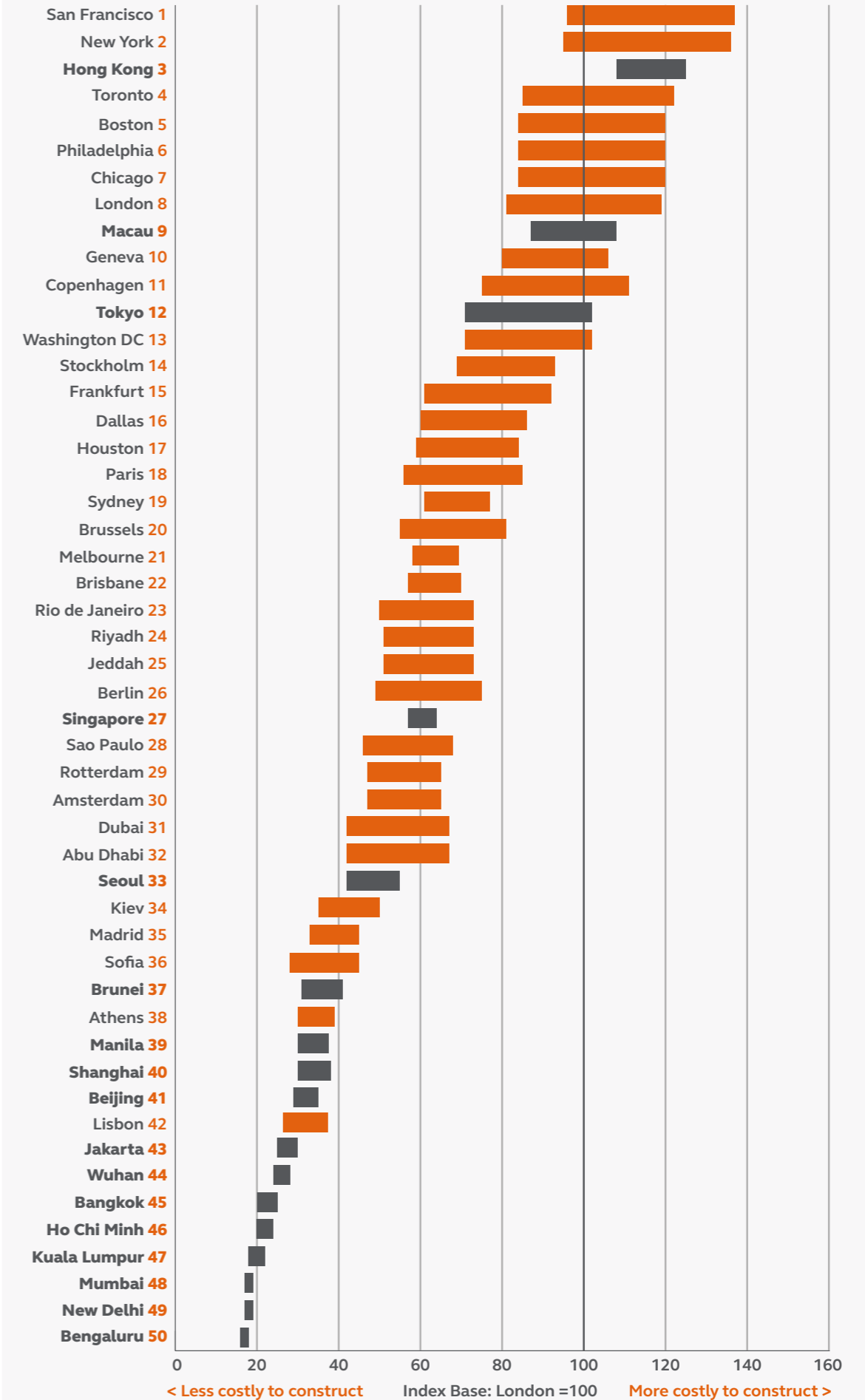
GLOBAL CONSTRUCTION MARKET TRENDS

COMMODITY PRICES

Commodities that are key to construction activities finished 2017 on a high, with solid growth in prices across the board. Generally, the rise in commodity prices will feed through as a small underlying inflationary factor on construction materials costs.
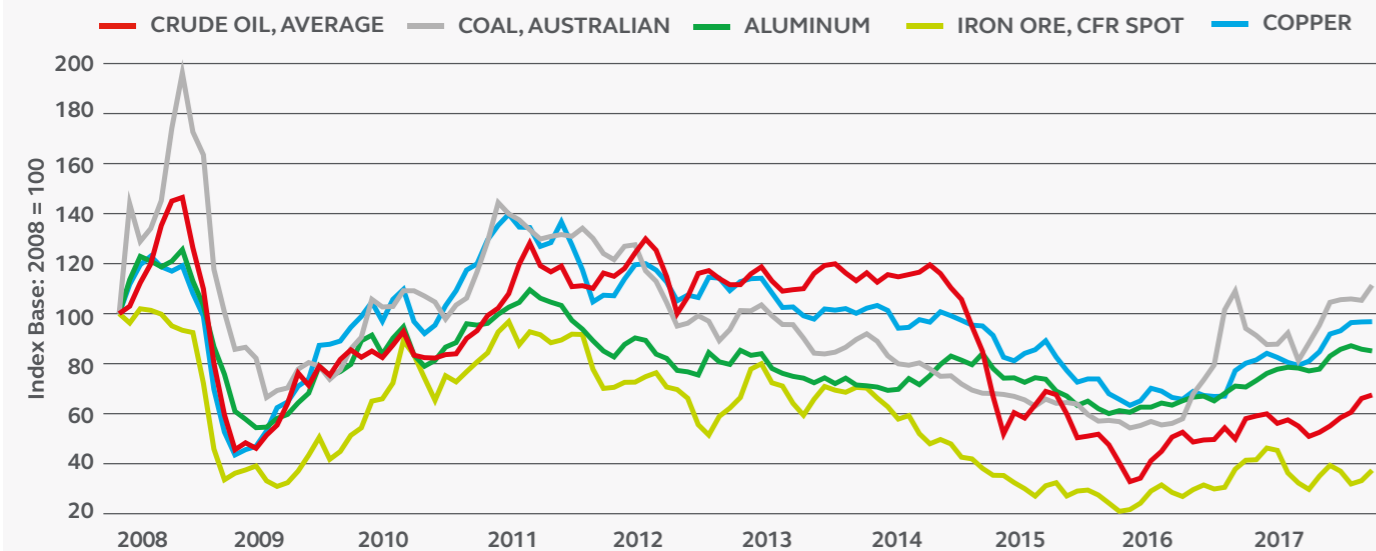
Coal rose almost 30 percent in 2017, predominantly due to cuts in production in China, driven by a shift to environmental policy changes. Energy prices are forecast to climb by an average of four percent in 2018. Average crude oil prices rose in 2017. Brent Crude rose 20 percent and currently sits at about $68/bbl. Global oil prices are anticipated to average $56/bbl in 2018. Coal prices are expected to retreat to $70/mt in 2018 following a strong 2017, as demand slows because of environmental initiatives to reduce coal use.

Metals largely saw increases in 2017. Aluminum, iron ore and copper rose 20 percent, 18 percent and 21 percent respectively. Strong global demand and supply constraints due to curtailing excess capacity by the Chinese authorities have been the main factors driving price inflation for these categories. A 10 percent fall in iron ore prices is anticipated in 2018 to be offset by increases in all base metals prices, particularly due to supply tightness.

Even after robust price rises in 2017, commodity prices are still cheap compared to levels seen between 2008 and 2012. The nature of commodity prices, influenced by a range of variable factors, means all these forecasts carry a high degree of uncertainty. Evolving supply and demand conditions, geopolitical events and changes in technology are all key elements that can change rapidly. Government policy associated with the phasing out of fossil fuels as well as declining power consumption are just two examples that could have an impact.
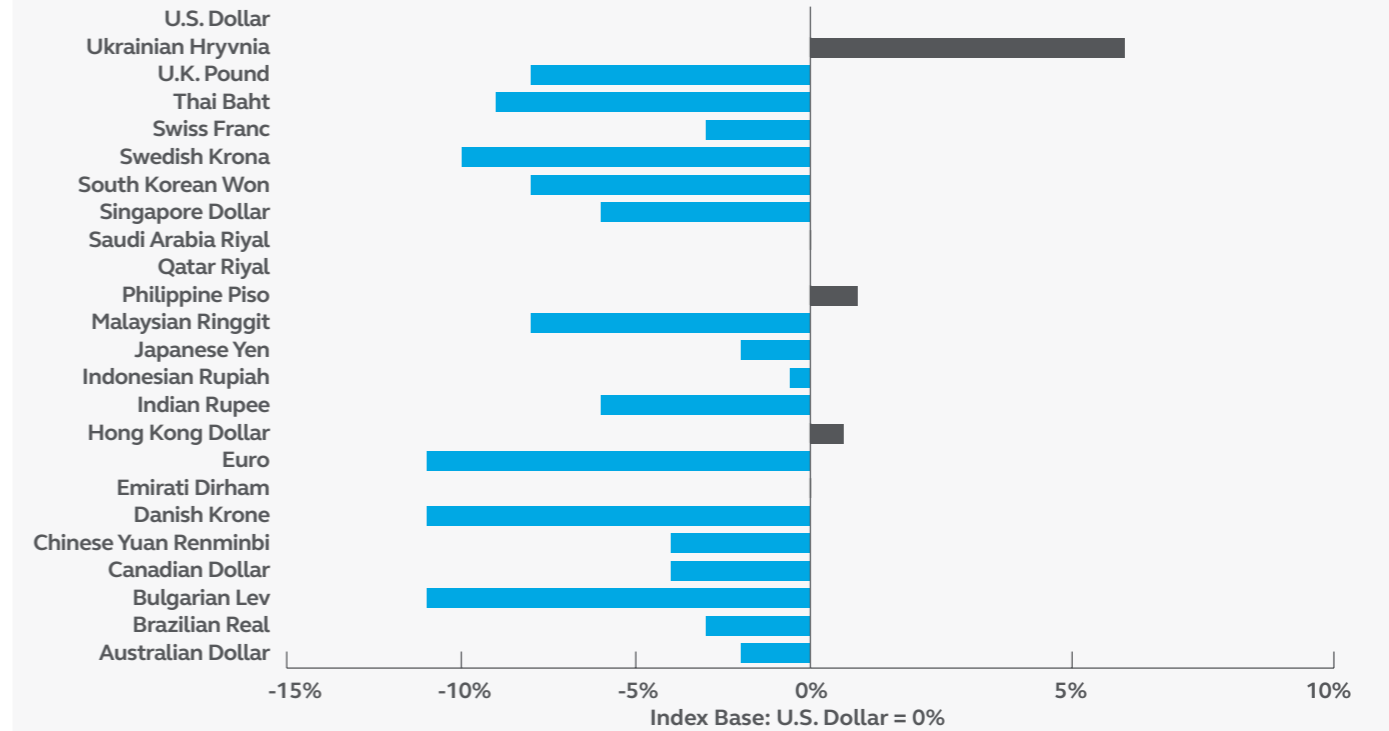
Commodities are dollar-traded, so any buyers with currencies that are weak against the dollar will feel price increases disproportionately, such as the U.K. in 2016.

U.S. DOLLAR MOVEMENT AGAINST GLOBAL CURRENCIES. NOVEMBER 2016-2017

SOURCE: XE.COM

CURRENCY

U.S. dollar exchange rates can be influential on the cost of construction materials. Some markets are therefore likely to benefit from their currency strengthening against the dollar in 2017, increasing their buying power for dollar-denominated goods. This is a positive opportunity for some markets, such as the U.K., where weak currency performance in 2016 only added to materials cost inflation.
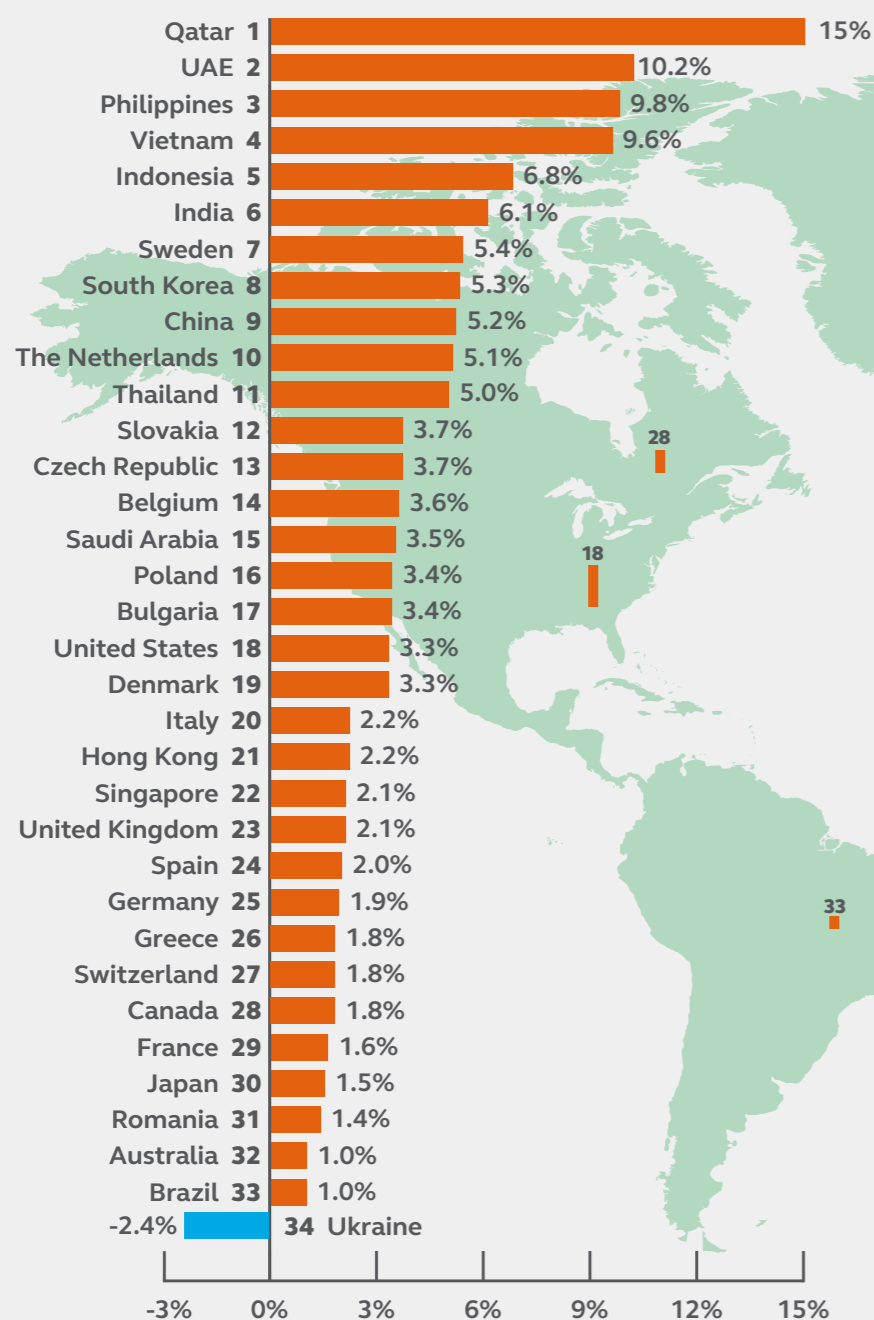
The U.S. dollar fell an average five percent against other global currencies in 2017. Low consumer price inflation and strong economic performance from other countries around the world has made the U.S. dollar comparatively less attractive. The eurozone saw the best year in a decade. Even the pound rallied against the dollar in 2017, after a dreadful performance in 2016 following the Brexit vote. Most analysts don't expect 2018 to be much better for the U.S. dollar. However, it is important to recognize that the greenback remains relatively strong overall, given its exceptional performance in 2016.

For overseas investors, construction is cheaper in locations where the local currency has fallen relative to the currency in which they hold their capital. Dollar-denominated investors such as those from Hong Kong, the Middle East and Norwegian sovereign wealth funds have been in a strong position in 2017 due to the dollar's relative strength, even though returns on existing investments will likely fall in value from exchange rate movements.

WORLD COMMODITY PRICE INDICES

SOURCE: IMF AND WORLD BANK

CONSTRUCTION AROUND THE WORLD

FORECAST CONSTRUCTION INDUSTRY VALUE, REAL GROWTH 2018. % YEAR ON YEAR CHANGE

Rank	Country	Growth
1	Qatar	15%
2	UAE	10.2%
3	Philippines	9.8%
4	Vietnam	9.6%
5	Indonesia	6.8%
6	India	6.1%
7	Sweden	5.4%
8	South Korea	5.3%
9	China	5.2%
10	The Netherlands	5.1%
11	Thailand	5.0%
12	Slovakia	3.7%
13	Czech Republic	3.7%
14	Belgium	3.6%
15	Saudi Arabia	3.5%
16	Poland	3.4%
17	Bulgaria	3.4%
18	United States	3.3%
19	Denmark	3.3%
20	Italy	2.2%
21	Hong Kong	2.2%
22	Singapore	2.1%
23	United Kingdom	2.1%
24	Spain	2.0%
25	Germany	1.9%
26	Greece	1.8%
27	Switzerland	1.8%
28	Canada	1.8%
29	France	1.6%
30	Japan	1.5%
31	Romania	1.4%
32	Australia	1.0%
33	Brazil	1.0%
34	Ukraine	-2.4%

AMERICAS

United States. The construction market in the U.S. is one of the largest in the world, with output reaching over $1.25 trillion last year and expectations for growth to $1.4 trillion by 2020. New York, San Francisco and Boston are all particularly hot markets. Construction output in the U.S. rose almost five percent in 2017 and is expected to rise by up to another eight percent in 2018. The private residential sector is a bright spot and growth in the infrastructure sector is also expected to accelerate. However, President Trump's infrastructure plan, which relies heavily on private investment supported by tax credits, and which has not yet been developed in detail, could fall short of delivering the $1 trillion in promised new investment. It is also likely to focus on new assets rather than fixing existing, failing infrastructure.

Brazil. 2018 heralds an exit from recession for Brazil and a return to growth. The construction sector is expected to grow by about one percent in 2018. An improved housing market and more buoyant investment activity are expected to be the main driving forces – albeit from low bases. The Brazilian government is also planning an infrastructure investment program to stimulate the economy and generate jobs.

SOURCE: BMI

ASIA

China. Construction demand in China is expected to see a good growth rate of six percent 2018 and five percent in 2019. This represents a slowdown in growth compared to previous years. This is predominantly being driven by a gradual withdrawal of government financial support in some sectors to support the economic goal of rebalancing China's economic growth from fixed investment to consumer demand. China's One Belt, One Road project is also contributing significantly to global construction demand, with over $900 billion of planned projects – this could divert any spare resources into overseas markets.

Hong Kong. The construction market is slowing down and is partly due to a number of large infrastructure projects being completed, such as the Hong Kong-Zuhai-Macau bridge. However, there continues to be a good level of demand of buildings work in the public and private sector which is keeping the market buoyant. We expect growth in construction output to be two percent per annum to 2021 with infrastructure and residential sectors being the main sources of demand.

Singapore. The construction industry in Singapore is expected to see relatively slow growth for the near future, reflecting its mature high-quality infrastructure provision and the small size of the market. This contrasts with the opportunities in high-value, long-distance transport and power transmission projects that are gaining traction in neighboring markets like Indonesia and Malaysia. That said, there is still a good pipeline of infrastructure projects that support the growth forecast.

India. India's construction sector will see good growth, expected to be more than 50 percent over the next 10 years. Growth is being driven by rapid urbanization and industrial development. There are significant and fundamental infrastructure needs, particularly across power, rail and road sectors to connect rural areas. 2017 saw adverse impact from Prime Minister Narendra Modi's demonetization policy. The attempt to reduce corruption meant that workers without bank accounts could not be paid in cash. This stifled output but is a key part of the initiative to improve transparency and the overall business environment in India. Other policy initiatives around boosting foreign investment, reducing red tape and cutting transaction costs will also all support strong growth in construction demand going forward.

AUSTRALIA PACIFIC

Australia. The economy grew by 2.8 percent in 2017. The construction sector is forecast to grow by just over one percent in 2018, rising to three percent by 2020. Australia continues to be an attractive market for foreign investment. Strong population growth will continue, concentrated mainly in Brisbane, Sydney and Melbourne, which will generate demand for social and economic infrastructure. Low interest rates and a weakening Australian dollar will continue to fuel private investment. China remains a huge source of investment in the built asset sectors. Labor costs are rising to the tune of two to three percent per annum, driven by skills shortages.

PROJECT SPOTLIGHT

MANCHESTER AIRPORT TRANSFORMATION PROGRAM

Manchester Airport is undergoing a $1.38 billion transformation program, the largest construction project ever delivered in England's northwest. Due to the size, it was essential to ensure that all stakeholders are working to consistent standards and sharing information in a collaborative way to reduce duplicated effort and create a single source of project and program data.

A Digital Project Delivery standard operating procedure (SOP), created by Arcadis as the Managed Services Provider, is enabling the identification, production, management and delivery of consistent datasets for project program use; BIM Level Two Standard and improved collaboration. By working alongside Manchester Airport Group (MAG) to develop the SOP for asset integration, Arcadis helped MAG avoid $1.65m in costs from asset marking and registration and provided a completely paperless handover. The use of the SOP is enabling MAG to understand their future asset inventory one year prior to phased handover, improving their ability to negotiate and employ operation and maintenance contractors, resulting in a greater commercial advantage for the business. Within the program is a bespoke Information Delivery Plan, which reduces the effort of data creation, including measurement for estimating and costs management, by extracting that data from its source, using BIM. The data is used to populate asset databases far in advance of traditional processes, saving thousands of man hours.

The SOP is meeting its objective to increase value for the Program and MAG. It is enabling the analysis or accurate and precise information to reduce duplicated effort and provide stakeholders with information they require to perform their role, thus, relieving many collaboration and knowledge sharing challenges found in a traditional construction environment. All this to ultimately make Manchester Airport's transformation a success for those who work and use the airport.

EUROPE

The European construction industry saw modest aggregated growth of two percent in 2016 and 2017. Growth is likely to remain between 2 percent and 2.5 percent per annum to 2021. Investment in infrastructure drives a large share of construction activity. The ability of EU partners to sustain infrastructure investment post-2019, after the U.K., a top-five budget contributor, left the bloc, is a significant risk to many markets, particularly in the East, where there is a greater dependence on EU support. However, the European economy is surpassing growth expectations, registering the highest rate for a decade, and this is likely to support growth in construction activity.

United Kingdom. The U.K. is still experiencing uncertainty following the vote to leave the European Union in June 2016. 'Brexit' negotiations are still ongoing and won't be concluded until October 2018 at the earliest. However, despite this, the U.K. has performed exceptionally well economically, attracting significant foreign investment and maintaining sustained levels of consumption. Construction output has continued to grow and is at a historical peak. Contractors continue to face constraints to capacity which has led to sustained cost and price inflation. Growth in construction is expected to

be circa two percent in 2018, commensurate with other major European economies. In addition, even after the completion of Crossrail, the U.K. will still be home to Europe's largest construction projects: the High Speed 2 railway and the Hinkley Point C nuclear power station.

Germany. Germany's current account surplus is at a record high and the labor market is at virtually full employment, both key indicators of a well-performing economy. However, Germany may not have invested enough in itself, and its journey to a big current account surplus means constrained investment in infrastructure and productive capacity. In addition, record high employment and an aging workforce threaten to produce future labor shortages that undermine the long-term productive capacity of the economy. Construction sector growth is forecast to be 2.3 percent per annum over the next five years.

France. Future construction industry growth is expected to be relatively flat, likely to average 1.4 percent per annum to 2026. The infrastructure sector, especially transport and power, is set to experience positive expansion, assisted by continuity from the Macron government regarding infrastructure policy. But France's stubborn unemployment rates will likely prevent a recovery in the demand for housing, leading to subdued forecasts for the

residential and non-residential building sectors, which represent more than 80 percent of France's construction industry value. An uncompetitive labor market could also generally discourage foreign investment into construction projects.

Netherlands. The economy is expected to grow by 3.2 percent in 2018. A favorable international economy, low interest rates, expansive budgetary policy and a persistently strong housing market are key factors. The unemployment rate is back below five percent from a high of eight percent in 2014. The construction sector is set to record solid growth of over five percent in 2018, supported by a broad range of projects at various stages of development across the transport, energy, residential and social infrastructure sectors. Prices in the construction sector have been rising fast, 7.5 percent in 2017, - with a continuation of this trend expected in 2018.

Poland. Poland's construction sector is expected to grow by over three percent in 2018. The Polish economy is expected to outpace the European average with annual growth of over three percent anticipated over the next five years. Residential, commercial and industrial sectors are all likely to benefit from increased activity levels supported by economic expansion.

MIDDLE EAST

UAE. The UAE construction industry remained flat in 2017 as the country prepared for the introduction of five percent value added tax (VAT) in January 2018. A recent IMF World Economic Outlook Update notes that 'the United Arab Emirates economy is expected to recover gradually' in 2018, due to an improving oil price and the Dubai government announcing a 19.5 percent increase in 2018 state budget, focused largely on infrastructure spend.

In Dubai, the upcoming Expo 2020 should lead to an increase in construction activity as the Emirate prepares for the event and the legacy delivery of District 2020. In Abu Dhabi, there's a continued focus to accelerate diversification and shift dependence away from oil revenues. This is providing opportunities for the private sector to create wealth.

At present, there is an oversupply of real estate assets across all sectors in parts of Dubai and Abu Dhabi, following the completion of several new master planned developments. This may result in a need to consider change of use, refurbishment, or the disposal of older buildings.

Saudi Arabia. Preparation for the introduction of value added tax (VAT) in 2018 and significant restructuring of the public sector as part Vision 2030, saw the KSA construction industry maintain a slow course in 2017.

The IMF estimates that the Saudi economy will grow by 1.6 percent this year, rising to 2.2 percent in 2019. This will be largely due to rising oil prices and the Saudi government announcing its biggest expansionary budget in history, with heavy investment planned in infrastructure and housing. This is all part of the Kingdom's vision to shift dependence away from oil revenues and to achieve its long-term goals of diversifying the economy and increasing contributions from the private sector.

Outside of the announced fiscal budget for 2018, the Saudi government also plans to invest an additional $22 billion on a series of mega-projects including Neom, Red Sea and Qiddiya. These will be overseen by the Public Investment Fund and should drive increased construction activity within the Kingdom and attract established international contractors to the market.

Qatar. 2017 was not without challenges for Qatar, but the economy weathered these well, with the IMF reporting real GDP growth of 3.1 percent in the second half of the year. Incentives launched in response to the diplomatic situation all helped to boost production in the primary sector, while government support led the construction sector to remain flat.

In 2018, the IMF forecasts 2.8 percent growth, rising to 3.1 percent in 2019 and the government's 2018 budget shows a modest increase of 2.4 percent in spending. Ongoing efforts to strengthen relationships outside the Gulf Cooperation Council, Qatar's global growth ambitions and a relatively diversified economy should all prompt economic growth. The economic sanctions imposed by neighboring countries will continue to present a challenge.

Existing commitments to deliver facilities and infrastructure required for the 2022 FIFA World Cup™ and plans to increase liquified natural gas outputs by 30 percent will see Qatar's construction industry return to growth toward the end of 2018. However, as Lusail City continues its expansion, and Qatar's population growth slows, there's a risk of oversupply of real estate assets across multiple sectors. Clients may need to consider change of use for existing assets and the disposal of older assets.

Hong Kong's cost of construction remains high when compared to other world cities mainly due to an ageing workforce, a reliance on imported materials and expensive finishes. The government is looking at several initiatives to apply technology and digital solutions to improve productivity and efficiency to stabilize the city's construction costs.

HONG KONG FOCUS

Hong Kong retained its position as the most expensive city to build in Asia despite falling 1 position to number 3 in the global ranking, just behind San Francisco and New York.

HONG KONG

HONG KONG 2018 MOVEMENT

1 ASIA RANKING

3 GLOBAL RANKING

The 2018 International Construction Cost is indicative of the current market conditions as the high cost of labor and expensive finishes continue to drive up the cost of Hong Kong's construction industry. The city is also juggling a raft of other factors such as the use of traditional construction methods and limited site space, creating a need for off-site storage and having to build upwards.

Despite high construction costs, Hong Kong's market is slowing down and this is partly due to several large infrastructure projects closing in 2018, such as the Hong Kong-Zhuhai-Macau bridge. However, the forecasted construction output is estimated to reach a rate of around 2% per annum by 2020-21, with new infrastructure and residential projects being the main sources of demand, which includes the extension of the airport with a third runway system.

Hong Kong's construction industry suffers from relative low productivity when compared to other regions. To address this, the government has made commitments in the 2018-19 budget announcement to make available HKD$1 billion for a Construction Innovation and Technology Fund to promote the adoption of technologies such as Building Information Modelling (BIM), which will be used in the design and construction of major government capital works projects, and Modular Integrated Construction (MiC).

Additionally, the government is piloting the Buildability Evaluation System (BES), taking advantage of buildable designs to ensure practicality and effectiveness of methods well in advance, and thereby looking at construction costs during the early design stages.

Francis Au, Head of Hong Kong and Macau, commented: "The city has been a slow adopter of digital solutions such as BIM and MiC. With the government's HKD$1 billion Construction Innovation and Technology Fund, we hope to see greater pick-up of technologies, which will in turn improve the industry's productivity and efficiency, as well as stabilizing the construction cost."

The government is focusing on Integrated Digital Delivery (IDD) to manage construction work flows. This process goes beyond digital design with Building Information Modelling (BIM), and extends to manufacturing, fabrication, construction and eventually asset management. This will be a game changer for Singapore's construction industry.
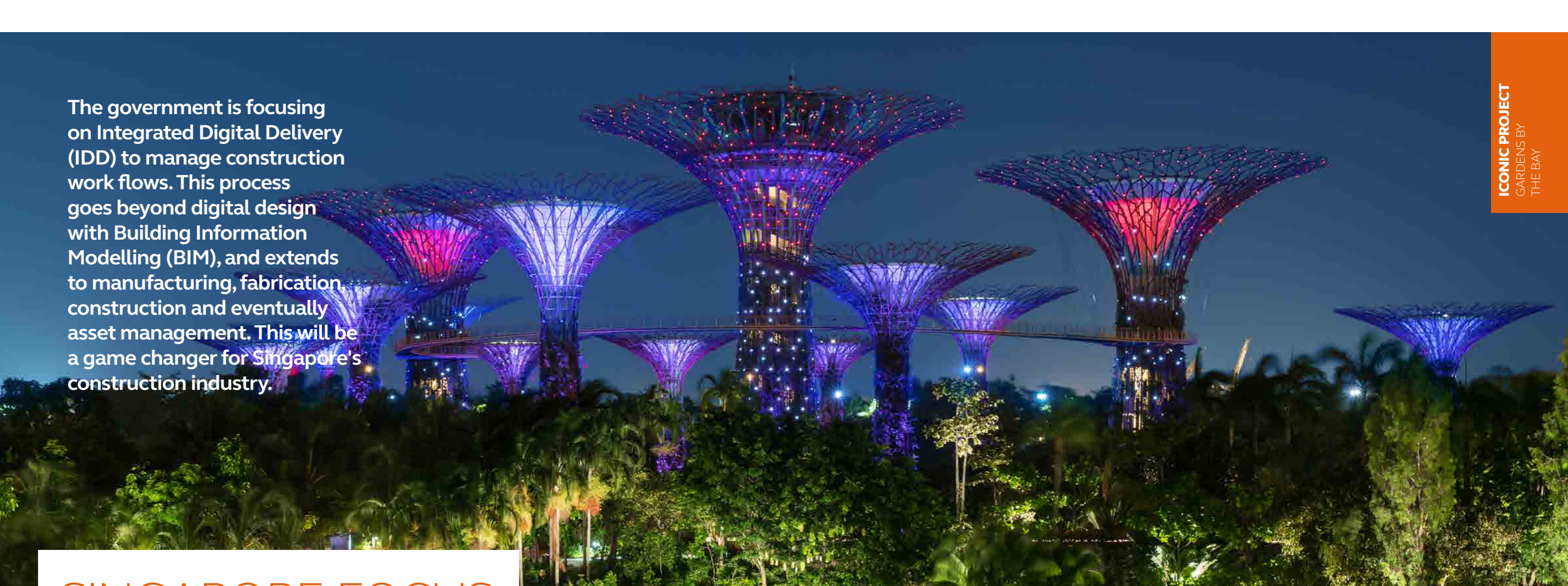
SINGAPORE FOCUS

Singapore ranked number 27 as the most expensive city to build in globally and is number 4 in Asia, behind Hong Kong, Macau and Tokyo.

SINGAPORE
2018 MOVEMENT

4 ASIA RANKING

27 GLOBAL RANKING

SINGAPORE

Singapore's construction market has started to pick up, after several years of continuous correction caused by over-supply and a slowing economy. Demand is higher and there has been a change in market sentiment as construction cost levels are no longer dropping. The upturn is leading to an optimistic outlook, and construction cost movement for 2018 is anticipated to range between -1% and +2%. Public sector demand remains the key contributor with approximately 60% of the total forecasted construction demand.

This year's construction demand forecast is currently estimated to be between S$26bn and S$31bn and some notable projects in the pipeline for Singapore include the Deep Tunnel Sewerage System, the North-South Corridor, Singapore's first integrated transport corridor, and Terminal 5 at Changi Airport.

Like most of the world's most expensive construction markets, Singapore faces productivity challenges. Labor costs continue to be high due to foreign worker levies, so digital transformation and technology adoption is helping to make the construction sector more efficient, innovative and cost effective in the long run.

The Singapore construction sector has an excellent reputation for technology adoption to increase productivity, and some credit is due to the government for its foresight in promoting new technology. The government has been supportive of emerging new methods of construction to reduce labor-intensive work, such as the adoption of Design for Manufacturing and Assembly (DfMA). One type of DfMA is Prefabricated Prefinished Volumetric Construction (PPVC)

where it speeds up construction. It has also become mandatory in Singapore for numerous land parcels sold under the Government Land Sales Programme to implement PPVC to increase productivity. Other DfMA includes Prefabricated Mechanical, Electrical and Plumbing (MEP) Systems and DfMA adoption is expected to increase by 40% by 2020.

Khoo Sze Boon, Executive Director and Head of Cost Management and Quantity Surveying at Arcadis Singapore, commented: "We are delighted that the government is committed to ensure that work demand is maintained at sustainable levels in Singapore. Over the past 10 years, Singapore has maintained $20 billion and above in terms of construction demand. This has allowed stability in the Singapore construction sector."

CONCLUSION:

DIGITAL SOLUTIONS FOR HEATED MARKETS

As the global economy continues to grow, the construction sector in many cities risk becoming overheated, with costs spiraling ever upwards.

While rising commodity prices may play a small part, it is a lack of skilled and agile labor that is most likely to push up prices and put a squeeze on productivity in many cities.

Other industries have responded to this challenge by automating production processes, and they are now embracing digital technologies such as the Internet of Things (IoT) to push their productivity even higher.

All these solutions are open to the construction industry, and it must turn to them quickly in order to be able to meet the demand in the world's growing economies.

Almost every single stage of the construction process can now be digitized; from design to prefabricated offsite construction employing IoT technologies. This includes embedded technology that provides operational data once an asset is built, particularly with infrastructure such as smart roads.

All of this technology can generate data to empower the industry to be more efficient and productive while creating a higher-quality product best suited to the end user's needs. For example, Arcadis' work developing digital avatars to test the design of Sydney Metro is helping create transport infrastructure that works for all travelers.

Investors, clients and end users are increasingly digitally sophisticated, and this should lead to them expecting more digital innovation from the construction industry. Now is the time for the supply chain to respond.

METHODOLOGY

The comparative cost assessment is based on a survey of construction costs in 50 locations undertaken by Arcadis, covering 13 building types. Costs are representative of the local specification used to meet market need and function. The building solutions adopted in each location are broadly similar. As a result, the cost differential reported represents differences in specification as well as the cost of labor and materials, rather than significant differences in building function. Costs in local currencies have been converted into a common currency for the comparison, but no account has been taken of purchase power parity. High and low-cost factors for each building type have been calculated relative to London, where average costs equal 100, using the U.S. dollar as the common currency. The relative costs plotted in the chart represent the average high and low-cost factor for each of the 13 buildings included in the sample. Construction costs are current in Q4 2017. Exchange rates are current on November 30, 2017.

ABOUT ARCADIS

Arcadis is the leading global Design & Consultancy firm for natural and built assets. Applying our deep market sector insights and collective design, consultancy, engineering, project and management services we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets. We are 27,000 people, active in over 70 countries that generate €3.2 billion in revenues. We support UN-Habitat with knowledge and expertise to improve quality of life in rapidly growing cities around the world.

CONTACT US

Andrew Beard

Global Leader

Cost and Commercial Management
E andrew.beard@arcadis.com

Will Waller

Director - Head of Futures
E will.waller@arcadis.com

Francis Au

Head of Hong Kong and Macau
E francis.au@arcadis.com

Tim Risbridger

Country Head Singapore
E tim.risbridger@arcadis.com

Khoo Sze Boon

Head of Cost Management
and Quantity Surveying Singapore
E khoo.szeboon@arcadis.com

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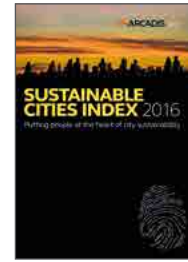
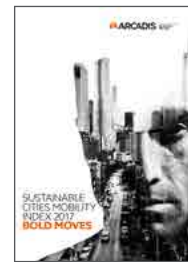Sustainable
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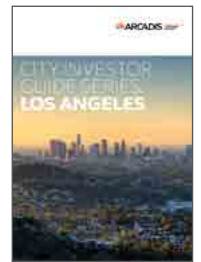Costs 2017

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