



# India Handbook 2019

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# Welcome to the Linesight India Handbook 2019.

Each year, we bring together all the important indices and trends in construction to give you the most comprehensive industry overview possible.

The handbook represents just part of our global Linesight Knowledge Center, which you can find at:

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# Contents

## India Market Review

Indian construction review and outlook*	6
1. Macro indicators	
1.1. India GDP 2012-2022*	7
1.2. US Dollar vs Indian rupee*	7
2. Linesight average Indian construction costs 2019*	8
3. Indices	
3.1. Construction cost index*	9
3.2. Wholesale price index - building materials	9
3.3. Consumer price index	10

\*Updated September 2019

## Global Insights

Global Market Review	14
How is sustainability impacting the built environment?	18
How capital projects are responding to Life Sciences market trends	22
How to build a data centre and keep the lights on	26
Workplaces of the future	32

## About us

What we do	34
Our values	35
Our culture	37
2018 - a year in review	39
Working with you wherever you are	41

**REVIEW & OUTLOOK:**

# **India Market Review**

# India construction review and outlook\*

**India's GDP is estimated to have increased by 6.6% per cent in 2017-18, and is expected to grow by 7.3% in 2018-19.**

Between April to July of 2018, GDP grew by 7.2% and 7%. India has retained its position as the third-largest start-up base in the world, with over 4,750 technology start-ups, with about 1,400 new start-ups being founded in 2016, according to a report by NASSCOM. India's labour force is expected to touch 160-170 million by 2020, based on the rate of population growth, increased labour force participation, and higher education enrolment, among other factors, according to a study by ASSOCHAM and the Thought Arbitrage Research Institute. Its foreign exchange reserves were US\$400.49 billion in the week up to March 2019, according to data from the RBI.

Real estate in India is expected to reach a market size of US\$1 trillion by 2030 and contribute 13% of the country's GDP by 2025, up from US\$120 billion in 2017. The Retail, Hospitality and Commercial sectors are also growing significantly, providing much-needed infrastructure for India's evolving needs.

Sectors such as IT and

ITeS, retail, consulting and e-commerce have registered high demand for office space in recent times. Commercial office stock in India is expected to have reached 600 million sq.ft. by the end of 2018, while office space leasing in the top eight cities is expected to reach 100 million sq.ft. during the 2018-20 period. Grade-A office space absorption is expected to reach 700 million sq.ft. by 2022, with Delhi-NCR contributing the most to this demand.

The pharmaceutical sector was valued at US\$ 33 billion in 2017. The country's pharmaceutical industry is expected to expand at a CAGR of 22.4 per cent over 2015-20 to reach US\$ 55 billion. India's pharmaceutical exports stood at US\$ 17.27 billion in FY18 and have reached US\$ 19.14 billion in FY19. Pharmaceutical exports include bulk drugs, intermediates, drug formulations, biologicals, Ayush & herbal products and surgical.

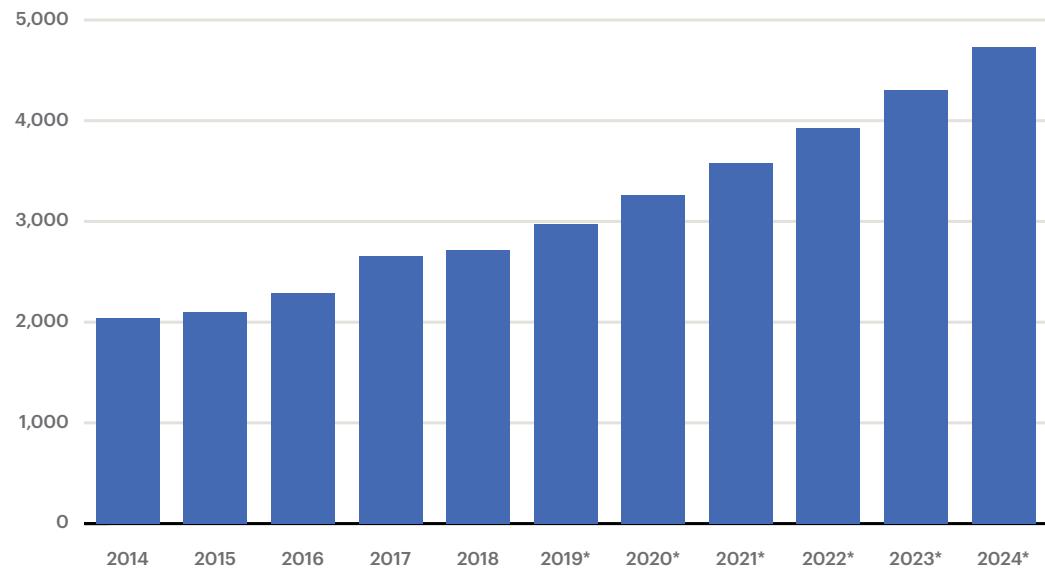
The Securities and Exchange Board of India (SEBI) has given its approval for the Real Estate Investment Trust (REIT) platform, which will facilitate all kinds

of investors in the Indian real estate market. It could create an opportunity worth Rs 1.25 trillion (US\$ 19.65 billion) in the Indian market over the coming years. The emergence of nuclear family units, rapid urbanisation and rising household income are likely to remain the key drivers for growth in all spheres of real estate, including residential, commercial and retail. In particular, rapid urbanisation in the country is pushing the growth of real estate. More than 70% of India's GDP will be contributed by urban areas by 2020.

Cross-border capital inflows to India's real estate sector have increased 600% during the 2012-17 period, to reach US\$2.6 billion. In 2017, India ranked 19th out of 73 countries in attracting cross-border capital to its property market. Private equity and venture capital investments in the sector reached US\$3.37 billion between January and October 2018. Between March 2015 and 2018, the retail segment in Indian realty attracted private equity investments of around Rs 5,500 crore (US\$ \$853.4 million).

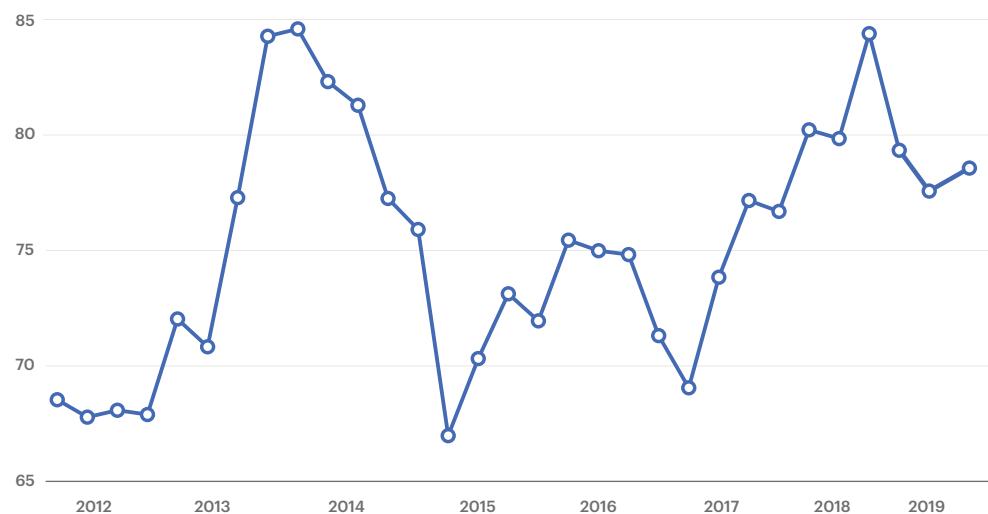
# 1. Macro indicators

## 1.1. India GDP 2014-2024\*



Source: IMF

## 1.2. US Dollar vs Indian rupee\*



Source: European Central Bank

## 2. Linesight average Indian construction costs 2019\*

		Cost range USD	
		from	to
<b>Residential</b>			
Apartments, high rise, average standard	Apartment units with fit-out, including air-conditioning, kitchen cabinets and home appliances, but excluding decorative light fittings and loose furniture.	519	662
Apartments, high rise, high end	Apartment units with good quality fit-out, including air-conditioning, kitchen cabinets and home appliances, but excluding decorative light fittings and loose furniture.	872	1,051
Terraced houses, average standard	Houses with fit-out, including air-conditioning, kitchen cabinets and home appliances, but excluding decorative light fittings, loose furniture, garden and parking.	399	420
Detached houses, high end	Houses with good quality fit-out, including air-conditioning, kitchen cabinets and home appliances, but excluding decorative light fittings, loose furniture, garden and parking.	525	552
<b>Commercial/Retail</b>			
Medium/high rise offices, average standard	RC structure, including small office with simple fit-out and M&E, but excluding a/c and heating.	436	473
High rise offices, prestige quality		546	578
Out-of-town shopping centre, average standard	Including public area fit-out and M&E, but excluding shop fit-out.	425	462
Retail malls, high end		594	641
<b>Industrial</b>			
Industrial units, shell only (Conventional single storey framed units)	RC structure with steel roof and M&E to main distribution, but excluding a/c, heating and lighting.	341	399
Owner operated factories, low rise, light weight industry	RC structure, including small office with simple fit-out and M&E, but excluding a/c and heating.	362	425
<b>Hotels</b>			
Budget hotels - 3-star, mid market	1) Interior decoration 2) Furniture (fixed and movable) 3) Special light fittings (chandeliers, etc.)	819	909
Business hotels - 4/5-star	4) Operating Supplies and Equipment (OS&E) excluded.	1,276	1,513
Luxury hotels - 5-star		1,613	1,765
<b>Other</b>			
Underground/basement car parks (<3 levels)	RC structure.	289	310
Multi storey car parks, above ground (<4 levels)	RC structure, natural ventilation, no facade enclosure.	221	242
Schools (primary and secondary)	Including fit-out and a/c, but excluding educational equipment.	273	310
Students' residences	Including fit-out, loose furniture and a/c.	310	341
Sports clubs, multi purpose sports/leisure centres (dry sports)	Dry sports (no swimming pool) and are for 'leisure centre' type schemes including main sports hall, ancillary sports facilities, changing and showers, restaurant / cafe, bar, etc. Costs include a/c, Furniture, Fittings and Equipment (FF&E).	604	630
General hospitals - public sector	Excluding medical and operating equipment.	662	725

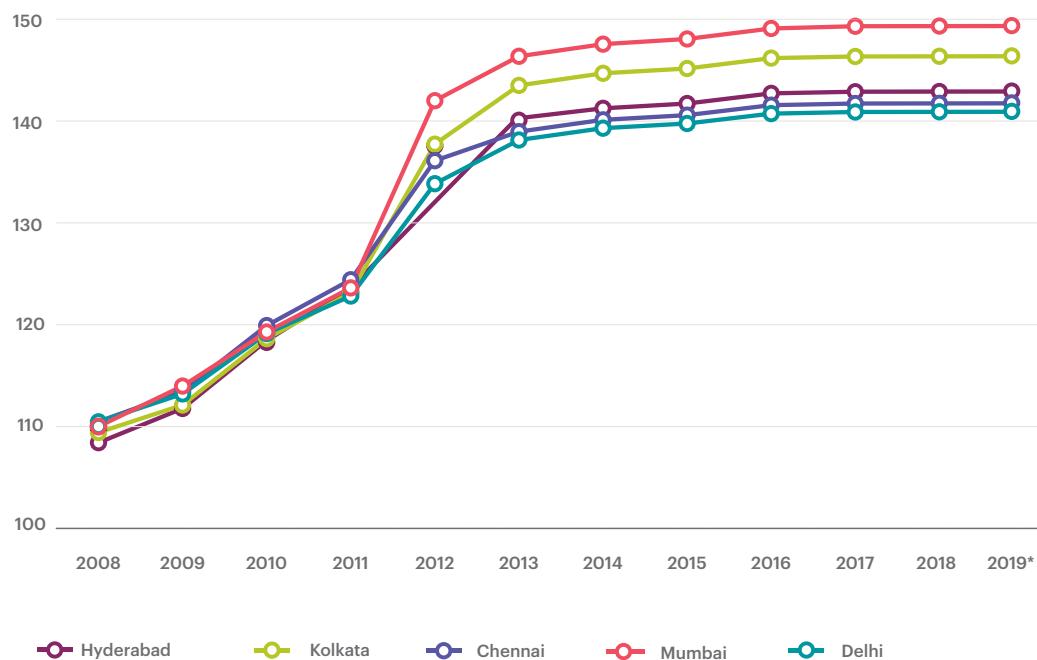
**Notes:** 1. 1 USD = 72 INR

2. The costs for the respective categories given above are averages based on fixed price competitive tenders.
3. The costs per square metre are based on Construction Floor Areas (CFA) measured to the outside face of the external walls/external perimeter including lift shafts, stairwells, balconies, plant rooms, water tanks and the like.
4. All buildings are assumed to have no basements (except otherwise stated) and are built on flat ground, with normal soil and site condition. The cost excludes site formation works, external works, land cost, professional fees, finance and legal expenses.
5. The standard for each category of building varies from region to region and do not necessarily follow that of each other, these rates are based on projects in Mumbai.
6. Average costs as indicated should not be used for insurance valuation purposes. The costs are representative of typical specifications for each type of project. The rates shown are average construction build only costs and do not include GST, professional fees or allow for future inflation.

**Source:** Linesight

## 3. Indices

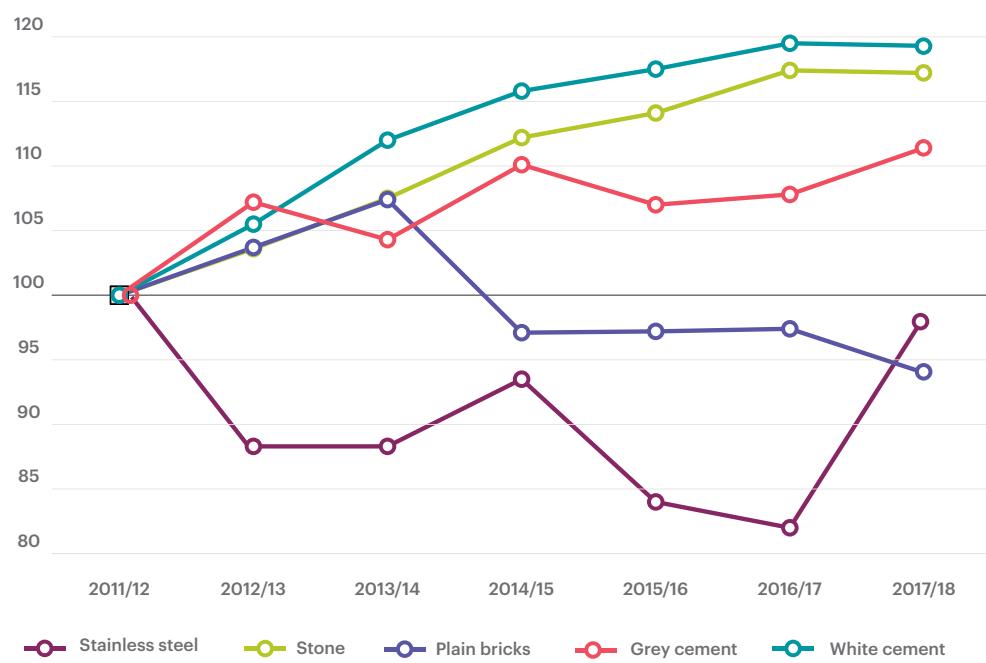
### 3.1. Construction cost index\*



Note: \*2019 figures to July

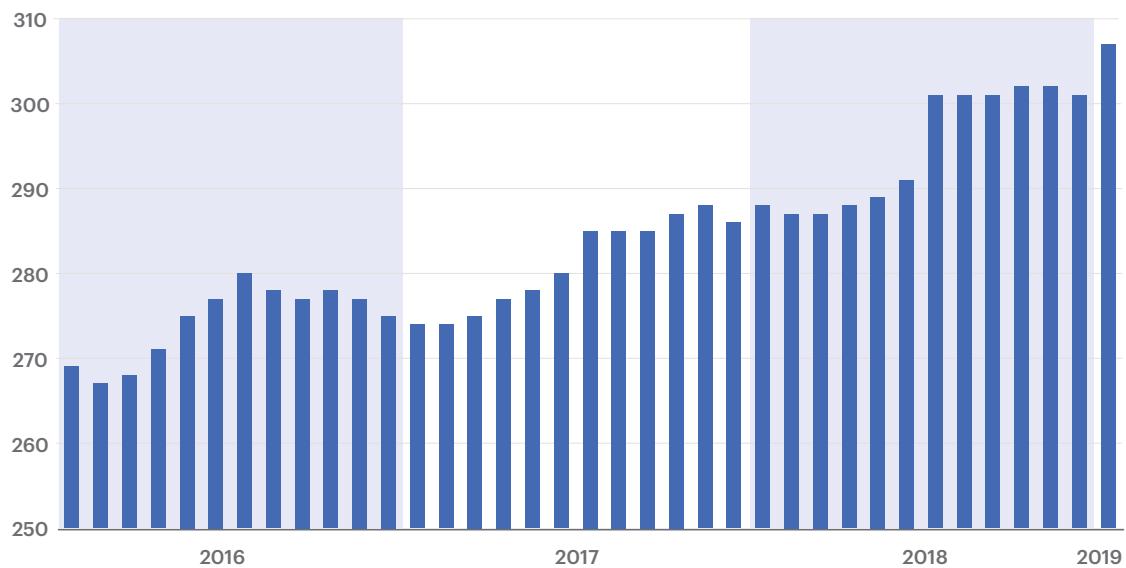
Source: Construction Industry Development Council, India

### 3.2. Wholesale price index - building materials



Source: Office of the Economic Advisor, India

### 3.3. Consumer price index



**Source:** Government of India Ministry of Labour and Employment Bureau

**REVIEW & OUTLOOK:**

# Global Insights

# Global Market Review

## Trade dispute between the world's two largest economies has the global economy holding its breath in anticipation of the outcome.

Although the deadline has recently been extended, the potential outcome in the current US-China trade dispute continues to cast a shadow over global economic prospects. The IMF has reduced its global growth projection for 2019 by 0.2 percentage points since its projection in October 2018.

When asked what had changed since October at the World Economic Forum Annual meeting in Davos, Christine Lagarde (Managing Director of the IMF) responded that it is the level of risk and the acceleration of the pace at which risks are materialising.

The reduction to 3.5% growth in 2019, is largely due to weaker performances in Europe and Asia, specifically relating to trade tariffs between the US and China, and Brexit. However, as Lagarde points out, it is still growth, albeit a little more modest than previously predicted.

### US set to break record despite slowdown

The strong performance of the US economy is expected to continue in 2019. The financial results for 2018 were delayed due to the partial government shut-

down in January, however figures show that significant growth in the first three quarters were balanced by a significant slowdown in the fourth quarter.

Commentators are expressing the view that the beneficial impact of tax reforms introduced by the Trump administration are fading. Nevertheless, the economy is in a strong position and the Federal Reserve has indicated that it intends to implement moderate rate hikes in 2019 and 2020, in order to keep the economy from overheating amid rising inflation and a rapid decline in unemployment. If the current expansion in the US economy continues past July 2019, it will have broken the previous record of a decade of expansion, which was set by the tech boom in the 1990s.

The US appears to be on track for this by avoiding overheating and financial imbalances - the classic causes of recessions. President Trump is determined to follow through on his campaign promise to end unfair practices with trading partners - late in 2018 he reached agreement

on the replacement of the NAFTA, now known as the USMCA (United States-Mexico-Canada Agreement). Earlier in 2018, he turned his attention to China, citing unfair trade practices and theft of intellectual property. China then made a counterattack, and hence we have a trade war on our hands.

### China to increase public spending

The Chinese economy, the second largest in the world, is expected to slow down further in 2019. The Government had been implementing a plan to reduce debt and risky lending. However, in response to the trade war, they are switching policy and tending towards a stimulus package of more fiscal spending, reducing the amount of money the bank needs to hold in reserve at the central bank and thus freeing up money for additional lending; building a resilient domestic market and stabilising economic growth and monetary easing in order to enhance growth.

## Europe still in flux

In Europe, uncertainty around Brexit still dominates. Business investment and domestic consumption in the UK is likely to remain subdued while the issue of Brexit is unresolved. A no-deal Brexit will likely cause a serious economic shock, while leaving the EU with a deal could result in a boost in investment and consumer sentiment, which has been subdued for the last number of years. Germany, the largest economy in the eurozone, is dealing with a softening of private consumption, and introduction of new automobile fuel emission standards have resulted in a weak industrial production.

Meanwhile, France is dealing with 'Gilet Jaunes' or the 'Yellow Vest' movement, and after 10 weeks the protests are finally showing signs of receding. However, what was previously viewed as an unorganised movement is morphing and changing, and the final shape it takes could be of political concern. In Italy, weak domestic demand and higher borrowing costs together with concerns about sovereign and financial risks have dampened domestic demand.

Ireland is set to see continued strong growth, which will shield it somewhat from the slowdown in the global economy. However, labour shortages, pressure on public services and rising prices caused by this strong growth present major challenges for Government and businesses alike. The outlook is overshadowed by the prospect

of a hard Brexit, which would negatively impact on Ireland's growth, with rural Ireland being particularly impacted.

## The GCC continues to diversify

Oil prices have been volatile thanks to swings in supply, and OPEC has agreed to cut production with a view to returning prices to US\$70 a barrel later in 2019. However, the GCC economy continues to improve, with a period of increasing interest rates and the prospect of stable oil prices. In particular, Saudi Arabia continues with its diversification plans as part of its 'Vision 2030' plan. And while the geopolitical situation remains a concern, improved economic dynamics are offsetting these concerns.

The governments continue their drive to reduce the economies' dependency on oil prices, and thus we have seen a trend of mergers and acquisitions, particularly in the banking sector. These M&As are seen as an opportunity to improve economies of scale and scope, and to improve market share in the global markets.

The governments are also focusing on continuing to attract foreign direct investment, which is stimulating economic growth and boosting investor confidence in the region. The UAE has made some significant investments in technology, and in particular renewable energy, with the ambition to have 44% of its energy requirements provided

through renewable resources by 2050.

Its investment in infrastructure continues, as it prepares for Expo 2020, which is providing a stimulus for the regional construction industry. While FDI investment in the UAE is expected to significantly increase with recent investment law provisions, relaxation of visa rules and other business-friendly reforms also appear poised to both attract qualified foreign workers. However, Egypt is expected to be the region's top performer in 2019, followed by Iraq. Iran will contract again in 2019 as US sanctions continue.

In Israel domestic demand should continue to support economic growth this year. Private consumption will likely benefit from a lower tax burden and still-favourable financial conditions. New gas and oil-related projects are expected to boost fixed investment growth. On the other hand, regional tensions remain a key downside risk and cloud the outlook.

**The Chinese economy, the second largest in the world, is expected to slow down further in 2019.**

## Asia Pacific remains robust

A recent press release by the Singapore's Ministry of Trade and Investment noted that its economy is, like many other global economies, expected to slow in 2019. The manufacturing sector, in particular electronics and precision engineering, is experiencing difficulties due to weakening global demand for semiconductors and associated equipment. While other sectors, such as wholesale trade, transportation and storage finance and insurance are expecting to moderate in growth, in line with the global economy. The information and communications, health and social services sectors are expected to remain resilient due to demand for IT and digital solutions. The construction industry is expected to see a pick-up after three consecutive years of contraction. Politically, there is speculation that general elections will be held this year to take advantage of the still-strong domestic growth and heightened public morale following bicentennial commemorations.

Remarkably, the Australian economy has gone 27 years without a recession. While

there are risks to the economy, it is expected that business investment, rising exports of commodities and Government spending will likely offset the contracting housing sector, subdued consumer spending and devastating drought.

Employment growth is strong, as the Australians consistently add more jobs than needed to accommodate the growth of the working-age population, resulting in reduced unemployment rates and participation rates increasing to the highest level on record. In addition to increased production capacity from LNG plants, the Australian resource sector is also seeing increased activity from the Chinese in response to the US tariffs, in iron ore and coal particularly, though this cannot be relied upon in the longer term. Thus, growth in 2019 should be moderate.



**Kim Hegarty**  
Associate Director

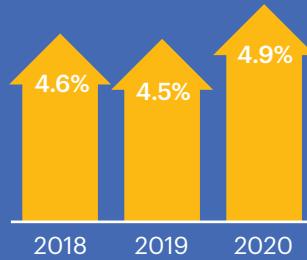
## Growth projections



Global Economy

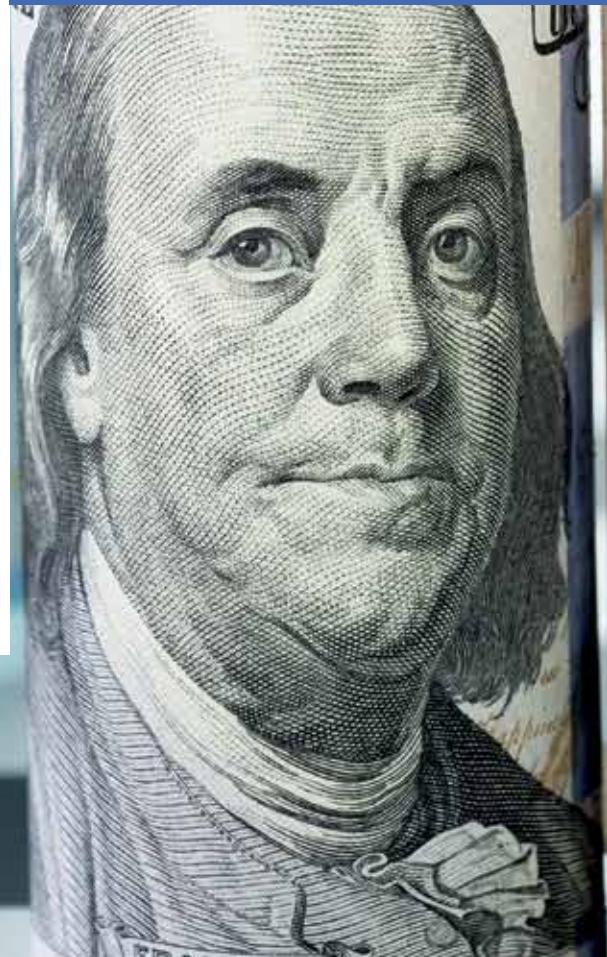


Advanced Economies



Emerging Markets & Developing Economies

Source: International Monetary Fund





## GLOBAL INSIGHT

# How is sustainability impacting the built environment?

**Sustainability is the process of maintaining change in a balanced environment, in which the use of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony, and enhance both current and future potential to meet human needs and aspirations.**

For many in the field, sustainability is defined in terms of three interconnected domains or pillars: environment, economy and society. Economy and society are constrained by environmental limits.

Sustainable building (aka green construction or green building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient through a building's life cycle. This extends from planning to design, construction, operation, maintenance, renovation and demolition.

There are several associated built environment goals; to design future projects to minimize energy and water consumption, as well as wastewater production; incorporate sustainable design principles into capital investment decisions; base capital investment decisions on life cycle cost, including the cost of known future expenditures.

### Positive impacts

Sustainability in buildings refers to their ability to be environmentally responsible throughout their life cycle, from planning and design through to operation and maintenance.

It is based on energy use, water use, indoor environmental quality, material selection and the building's effect on the site, while also addressing the impact on human health and the environment. It does this by:

1. Reducing waste, pollution and degradation of the environment
2. Efficiently using energy and water, along with other resources
3. Protecting occupant health and productivity

Ultimately, and intuitively, a greener and more efficient design and operation has less impact on the environment, as well as minimizing harmful effects on human health and the environment.

Beyond new developments, existing buildings need to be upgraded to be more energy efficient and use renewable energy sources to lower greenhouse gas emission.

The economic and social benefits associated with green building, as listed below, are also significant.

#### Economic benefits:

- Reducing operating costs
- Improving occupants' productivity
- Creating market for green products

#### Social benefits:

- Improving quality of life
- Minimizing strain on local environment
- Improving occupants' health and comfort
- Promote a better planet
- Sustain environment without disrupting natural habitat

#### LEED and WELL certification:

LEED is the most widely used green building rating system in the world, with a LEED-certified building offering considerable cost savings to owners, in terms of maintenance costs over the building's life cycle. LEED sustainability standards for design have now become a part of architectural design on a standard level, leading to the next level of occupant wellbeing, with the new WELL Building Standards.

WELL is a performance-based system for measuring, certifying and monitoring features of the built environment that impact human health and well-being through seven concepts: air, water, nourishment, light, fitness, comfort and mind. The below seven concepts are pillars upon which sustainability relates to the human side of a building:

- Air - achieve optimal indoor air quality to support the health and

well-being of building occupants. This promotes strategies to remove airborne contaminants, and promote pollution prevention and air purification.

- Water - optimize the quality of water available to building occupants and promote accessibility. This encourages strategies to ensure water is safe, clean and easily accessible through filtration, treatment and strategic placement.

- Nourishment - encourage healthier eating habits and food cultures that lead to better health. This includes availability and promotion of healthy food choices.

- Light - minimize disruptions to the circadian rhythms of building occupants, enhance productivity, and improve physical energy and mood levels. This is done by implementing strategies for better illumination, by providing criteria for window performance and design, light output and control, and appropriate visual activity.

**Sustainability in buildings refers to their ability to be environmentally responsible throughout their life cycle, from planning and design through to operation and maintenance.**



- **Fitness** - encourage integration of physical activity into the everyday life of building occupants by utilizing building design, accommodating fitness regiments, and providing the space and opportunity for an active lifestyle.

- **Comfort** - design of an environment that is distraction free, productive, and comfortable for the occupants, by promoting strategies to meet accessibility design standards, providing comfortable furnishings and workstations, controlling acoustics and thermal conditions, and reducing known discomforts.

- **Mind** - support the mental and emotional health and well-being of the occupants, by providing regular feedback and knowledge to them about their indoor environment. This is done through design elements, relaxation spaces, and health treatment and benefits

In addition, innovation is a key consideration, in terms of promoting the continuous

advancement of WELL and allowing project teams to achieve higher certification levels. There are five innovation features that each count as an optimization for any of the project types.

In summary, the age-old adage that the smallest changes can make a big impact rings true in the case of sustainability – the seemingly small measures implemented in green building processes are making all the difference. However, the importance of education, training, and the encouragement of occupant to implement best management practices for optimal sustainability cannot be underestimated.



**WELL is a performance-based system for measuring, certifying and monitoring features of the built environment that impact human health and well-being through seven concepts: air, water, nourishment, light, fitness, comfort and mind.**



Frances Graham,  
Project Director



## GLOBAL INSIGHT

# How capital projects are responding to Life Sciences market trends

**Global healthcare spending continues to increase dramatically and is projected to reach in excess of US\$10 trillion by 2022.**

This investment is driven in large part by the global increase in life expectancy, improved access to medicines and the growth of non-communicable diseases - most prominently cancer, heart disease and diabetes.

Contrary to popular perception, the Life Sciences sector covers a lot more than just pharmaceuticals. Beyond the top-tier pharmaceutical firms we all hear about, the core Life Sciences subsectors include medicine manufacturing, electromedical apparatus manufacturing, medical equipment and supplies manufacturing, and biological and chemical research and development.

In this diverse and highly-specialised group, one thing these businesses have in common is major capital requirements. Here are five trends that are shaping today's Life Sciences sector — and how they're affecting associated capital projects.

### **Cost is key**

The life sciences industry as a whole continues to experience mounting pricing pressures, increasing access to drugs globally, growth in new innovations and therapies, and uncertain trade policies.

These forces are causing the industry to become more cost-focused. This increased focus is particularly evident in the industry's capital investments, which tend to be much more targeted than they were just a few years ago. For instance, the rush to build more factories has been replaced by a more patient approach, wherein companies are waiting until they have a new product that has gone through all phases of clinical trials and all levels of regulation before they commit to building a new facility.

### **Outsourcing non-core responsibilities**

The outsourcing of key responsibilities is also becoming more common. For example, many life sciences companies have capital projects planned all over the world, meaning they will be spending a tremendous amount of capital over the next few years. However, these companies are simultaneously re-thinking their role in project delivery, choosing to focus more on the core operations of researching, manufacturing and selling their products. So, while their construction is increasing in number and size of projects their staffing is actually going down. This trend is most obviously manifested in the smaller in-house engineering and construction staffs we see today.

That doesn't mean that life sciences companies are eliminating their in-house capital management personnel entirely. Rather, many companies are moving to a hybrid execution model, leveraging a combination of internal and external resources. Overall though, the trend is clearly towards outsourcing project management responsibilities.

### **Expanding regulations**

Regulations in the manufacturing of pharmaceutical products will continue to rise, as global regulators share information across borders and the entire industry relentlessly pursues product safety.

People are ingesting what is being manufactured, and the facility, its equipment, products and even the air quality in the rooms

have got to be safe. Meeting these requirements means going through extensive testing and documentation. The process of commissioning and qualifying a facility to demonstrate safety and compliance to governmental regulatory agencies is already time- and resource-intensive, and as regulations continue to increase, so will this phase of a project.

### **New drugs and biologics**

Another trend is heavy investment on behalf of many pharmaceutical companies in the research, development and manufacturing of biologics and other new cancer drugs.

Spending on new cancer drugs alone is expected to grow by more than 50% over the next few years, and the production of biologics, in particular — drugs that are derived in some way from living organisms, and have revolutionized the treatment of many cancers and chronic conditions such as multiple sclerosis, arthritis and rheumatoid arthritis, Crohn's disease and other auto-immune diseases — is expected to skyrocket over the coming several years.

**Companies are waiting until they have a new product that has gone through all phases of clinical trials and all levels of regulation before they commit to building a new facility.**



However, biologics and cancer treatments are expensive and time-consuming to research, test and produce, often taking many years and billions of dollars of investment before they hit the market.

### Industry consolidation

Mergers and acquisitions continue to dominate headlines in the Life Sciences sector, with big pharma hunting for the next generation of medicines against declining returns on R&D.

There has already been a large amount of consolidation in the industry, and experts are projecting that the larger mergers are likely to settle down. Consolidation among mid-sized manufacturers, however, especially among companies looking to take the lead in next-generation therapies or acquire producers that complement the company's core, will be the trend.

The life sciences industry continues to adapt and evolve to market conditions, a growing

global population, increased regulations, stiff competition and various cost pressures. In this complex and dynamic industry, capital projects are a microcosm of healthcare's broader challenges.



Nigel Barnes,  
Director



Jeff Peragallo,  
Director



**Mergers and acquisitions continue to dominate headlines in the Life Sciences sector, with big pharma hunting for the next generation of medicines against declining returns on R&D.**



## GLOBAL INSIGHT

# How to build a data centre and keep the lights on

**Data centres have gone from being almost hardly noticed to one of the most important pieces of infrastructure in the global digital economy. They host everything from financial records to Netflix movies.**

As a result, data centres have become a multibillion-dollar industry, precisely because their role is so important. Designing, building and supporting data centres requires strategic planning and careful construction in order to keep clients' mission-critical data secure and available 24/7 - regardless of what it is.

There are many factors which must be addressed when designing and building a data centre. For starters, it's all about power - finding it and managing it.

### Finding the power

Data centres require an incredible amount of electricity to operate and this electricity often requires the direct intervention of regional utilities in order to work. Energy infrastructure needs to be shifted, power lines need to be run and redundancies need to be established. The most secure data centres have two separate feeds from utilities, so that if something happens to one of the lines — like an unexpected squirrel attack — the centre doesn't immediately lose all of its functionality.

Coordinating that takes a lot of effort and often the clout of a large corporation in order to get anywhere. But even the big players need to check the policies of utilities and local governments in any area in which they are planning on building a data centre; they do this to ensure they will be able to establish those inputs. Because without that redundancy, data centres can be vulnerable to power outages that could result in not only the loss of critical customer data but also any negative impact on the brand of the data centre owner.

The price and availability of that power are also incredibly important considerations because a data centre is going to be a large draw at all times. With a significant amount of power going into computing, and even more

going into cooling computers down, it's no surprise that data centres are using more than 1.8% of the power of the entire United States. Again, companies planning data centres need to work with local governments and utilities for subsidies and deals that can make that energy easier to afford.

### Keeping the lights on

Much of the support infrastructure in data centres is focused on making sure that their power cannot be interrupted. Uninterruptible Power Supplies (UPS) -powerful batteries that can provide power almost instantaneously- are critical for this effort.

They ensure that during an emergency any power loss is returned in milliseconds, instead of seconds or minutes that could result in the loss of data or functionality for thousands of computer systems. But most UPS systems don't serve as back-up power for long. In other words, they simply don't have the kind of power storage capacity that it takes to power a data centre for more than a matter of minutes. In order to keep data centres fully running without utility power, data centre operators usually turn to large diesel-powered generators, stocked with 24-48 hour of fuel at all times.

All of this redundancy is required because of the incredible amount of energy that data centres use. But the other key factor in a data centre's success is the efficiency with which that energy is used.

That starts with the organisational strategy used for cooling.

### Staying cool

Data centres are carefully planned structures. Every square foot needs to contribute to the wider goals of powerful and efficient computing.

You can't just slam server racks together because their placement needs to fit in with the cooling system used to prevent overheating.

Data centres run hot, and today's advances in High-Performance Computing (HPC) mean that they are using as much as five times more energy than they used to. This makes a cooling solution one of the most important decisions that a data centre operator has to make.

By far the most common data centre cooling method involves airflow, using HVAC systems to control and lower the temperature as efficiently as possible.

**In order to keep data centres fully running without utility power, data centre operators usually turn to large diesel-powered generators, stocked with 24-48 hour of fuel at all times.**

## Rise of liquid cooling

While liquid cooling has historically been the domain of enterprise mainframes and academic supercomputers, it is being deployed more and more in data centres. More demanding workloads driven by mobile, social media, AI and the IoT are leading to increased power demands. As such, data centre managers are scrambling to find more efficient alternatives to air-based cooling systems.

The liquid cooling approach can be hundreds of times more efficient and use significantly less power than typical HVAC cooling systems. But the data centre market is still waiting for some missing pieces of the puzzle, including industry standards for liquid-cooling solutions and an easy way for air-cooling data centres to make the transition without having to manage two cooling systems at once. Still, as the growing need for more efficient cooling shows no signs of slowing, liquid cooling will likely become the norm in years to come.

Building a data centre is about executing an extremely complex plan, with input from experts in wide-ranging fields. Firms thinking about building their own data centre should consult with experts who have dealt with their specific difficulties before to ensure that all of these core areas can be built without incident.

Modern data centres are planned down to the last wire on Building Information Management (BIM) applications and similar software, so that the outcome is as guaranteed as possible before the first wall is erected. Data centres are key arteries of the digital economy, funneling the data of the modern economy between consumers, companies, governments and citizens. That takes a lot of energy!



Eoin Byrne,  
Associate

**The data centre market is still waiting for some missing pieces of the puzzle, including industry standards for liquid-cooling solutions and an easy way for air-cooling data centres to make the transition without having to manage two cooling systems at once.**





## GLOBAL INSIGHT

# Workplaces of the future

The commercial environment has been transformed from the office-based workplace of the past to the more open and collaborative space we see today. And now, we are beginning to see another transformation.

According to Gensler, the workplace of the future requires a profound change in how design supports its varied forms, meaning the design industry will have to set aside its old ways to look at the working environment holistically.

There are significant changes happening in the workplace, with a younger workforce, surge in innovation-driven businesses, global transition towards working across geographic and demographic markets, and economic and cultural shifts are becoming the new norm.

The new generation of workers is looking for work spaces suited to conversation among a few people, and for a balance between focus and the need to interact. There is a need now for the office workspace to be reshaped to interact with the community, and for smarter spaces that attract young, creative people.

### Redefining standards in space utilisation

Soaring real estate costs are driving higher density and greater utilisation of space. Many large companies are now forming global standards of office spaces, that are essentially a kit of parts to be adapted to different locations, such as tech hubs, easily configured offices, open-bench workstation neighbourhoods, and open network team areas.

According to the Ted Moudis & Associates 2018 workplace report, the square footage per person is staying the same; however, the number of offices has decreased, and the number of alternative seating continues to rise.

### A strong focus on amenities and well-being

Companies are placing more value on creating alternative space for focus, meetings and amenities for employees. There is an increasing amount of space being dedicated to mental and physical well-being for their staff. This amenities focus is driving activity in the workplace and encouraging movement throughout the space. The Internet of Things is allowing integration and accessibility of technologies

across multiple platforms, to facilitate agility.

Design that supports mental and physical restorative opportunities throughout the day to improve morale and increase productivity is a must. Companies are now more focused on creating spaces that reflect the brand and philosophy of the company.

### Working from home

Working from home is a perennial debate - some companies embrace it and some abhor it. In 2013, Yahoo banned employees from working from home, stating "some of the best decisions and insights come from the hallway and cafeteria discussions, meeting new people, and impromptu team meetings". Speed and quality are often sacrificed when we work from home. Richard Branson from Virgin responded, "it was a backward step in an age when remote working is easier and more effective than ever". Google noted that as few as possible people work remotely, noting that "there is something magical about sharing meals, spending time together and noodling ideas".

Working from home is more common among full-time workers over 55, and those with dependent children. It encourages employees' work/life balance cutting down on commuting time. Although there is the fear that not being seen in the office may cut down on promotion opportunities, pay increases and lower performance evaluations. And so, the debate goes on, with no clear winner. Although, with the pressure on higher density, the

greater utilisation of space and AI innovation, perhaps the pro-working-from-home lobby may win out in the end.

### Private space versus open-space interactivity

The pursuit of efficiency is leading firms which were office-heavy to opt for a more shared, open, team-based workspace, and with paper disappearing, libraries, records and administrative functions are being consolidated to reduce the footprint. Support spaces are being consolidated to allow more space for amenities. Activity-based work environments provide new amenities and a wider range of workspace types, while reducing the total area of occupancy. The forecast is that there will be an increase in semi-enclosed and small focus rooms, less executive suites, an increase in USF (usable square footage) per work seat in activity-based work environments, and an increase in both employer and building-provided amenity and wellness spaces.

**According to the Ted Moudis & Associates 2018 workplace report, the square footage per person is staying the same; however, the number of offices has decreased, and the number of alternative seating continues to rise.**

More visibility and transparency with open perimeters, transparent walls and low partitions are the new norm, providing a more inviting and connected environment. Informal collaboration spaces and alternative settings are helping to provide privacy zones in place of private offices.

Employees are sitting in open spaces with greater choices of where and how to work, including benching and sit-to-stand desks. On the other hand, there is a growing number of people and companies who are now thinking that the old days of the private office was not so wrong after all, allowing the closing of the door to avoid interruptions. Open office space has taken that decision away from people, and even with headphones, it is tough to avoid distractions.

Ultimately, people are different. They come in at different times, have diverse requirements, socialise at different times and have their most productive hours at different times. So, what is the solution?

There are several ways of making the environment fit all tastes, with

WorkDesign Magazine proposing the following key considerations for the workplace of the future:

- Flexibility is paramount
- Technology is the ultimate enabler
- Everything is connected, with fast, smart and integrated networks
- Personalization is prioritised
- Environmental threats necessitate change – Buildings & transportation need to reduce impact on environment and change to adapt to global landscape.

In summary, the workplaces of the future are a work in progress, with no shortage of ideas. It will be a rollercoaster ride to see what the future holds, but it is an exciting time to be involved in the commercial fit-out world.



Damien Coffey,  
Director



**More visibility and transparency with open perimeters, transparent walls and low partitions are the new norm, providing a more inviting and connected environment.**



# What we do

Our services are tailored for your project, delivering maximum efficiency from inception to completion. We specialise in key areas, to provide faster project delivery, greater cost efficiency and maximum value.



## Project Management

Delivering project success through strategic planning and stringent controls.



## Cost Management

Ensuring better value for money at every stage of the construction process.



## Program Management

Managing a network of projects simultaneously in order to deliver program success.



## Project Controls

Controlling every aspect of a project to ensure maximum performance and long-term success.



## Procurement

Adopting the most appropriate strategy to suit both public and private sectors.



## Supply Chain Management

Providing efficient logistic strategies to streamline the delivery of equipment and services.



## Health and Safety

Assuring compliance, and providing design teams and clients with expert advice and independent review.



## Consultancy

Providing professional, hands-on advice and guidance throughout every stage of your project.



## Planning and Scheduling

Controlling every aspect of a project to ensure maximum performance leads to long-term success.

# Our values

Over the years we have developed a way of working that ensures quality and consistency in how we operate. Our five core values inform what we do and how we do it:



## Partnership

We are focused on our clients' goals and work closely with them to achieve the best possible results. We believe in collaboration. When we share our experiences and combine our expertise, we can achieve great things.



## Progress

We believe in always moving things forward and finding better ways of working. We're not just focused on what we do but also on what we can achieve. We are driven by success – for our clients, our partners and each other.



## Integrity

We are fair, open and ethical in everything we do. We challenge things we believe to be wrong and are open to being challenged by others. We take pride in the quality, accuracy and independence of our work.



## Resourcefulness

We work around the world, in diverse sectors and for clients with distinct ambitions. This requires us to act effectively and creatively in new and complicated situations. We rely on our individual and collective abilities to resolve any challenges we may face.



## Long-term view

We believe in working sustainably, and so we build enduring relationships with our clients and partners. We work together in a way that is respectful and considerate of each other and the wider society in which we live.



# Our culture

# Our **bold ambition, honesty and confidence to deliver**, together with our commitment to cultivating **meaningful relationships** is what sets us apart.



**Our distinctive culture has always played a key role in our success. As a business we want to be intentional in maintaining and working within the principles of our distinctive culture.**



## Own and empower

We have a highly developed sense of responsibility for identifying problems, finding solutions and executing with excellence. As individuals and teams, we are free (and encouraged) to exercise our judgement to reach our goals.



## Embrace clarity

Our emphasis is on direct communication - our preference is always face-to-face, or to pick up the phone. We express ourselves clearly, honestly and effectively in our communication. We are pro-active in inviting and providing actionable feedback.



## Lead by example

We believe in mentoring as a way to strengthen and develop ourselves and provide the resources, environment and flexibility required. We practice 'reverse mentoring' between junior and senior employees - every single person in Linesight has something to teach.



## Bold ambition

We continuously develop our global team, with a shared drive and ambition to deliver exceptional results. We believe success is winning unreserved recommendations for exceptional work and impact. We always work with an eye on the future, whilst delivering on our commitments and objectives.



# 2018 A year in review



## JANUARY

We launched our Purpose Built Student Accommodation (PBSA) Report at a private symposium in Dublin.

## FEBRUARY

Patrick Ryan, Managing Director USA East Region, joined the panel at the Enterprise Ireland Leadership 4 Growth Programme, at the Consulate General of Ireland in New York.

## MARCH

Celebrating International Women's Day across the globe. Our colleagues in Dubai showing their creative side!



## JULY

Paul Brady took part in the Etape Du Tour, an annual amateur race on one stage of the Tour de France.

## AUGUST

Richard Joyce, Managing Director, Linesight Ireland, celebrated 30 years in Linesight!

## SEPTEMBER

14 members of the Linesight team from around the globe took on the formidable 700km Paris2Nice cycle, in aid of the Irish Youth Foundation.



## APRIL

Shay Dahan, Director of our Israel operations, ran 500km across Israel in eight days to raise funds for Krembo Wings, a youth movement for children with special needs.

## MAY

Des O'Brien became the fifth member of the Linesight team to be appointed President of the Society of Chartered Surveyors Ireland (SCSI).

## JUNE

The appointment of our new Country Director for India coincides with the opening of our new office in Mumbai.



## OCTOBER

Linesight teams from Dublin, New York and Singapore took on the Run in the Dark challenge in aid of the Mark Pollock Trust.

## NOVEMBER

We marked the launch of our Build-to-rent (BTR) research report, with a breakfast briefing in Dublin that drew in over 70 high-profile industry stakeholders.

## DECEMBER

A number of our colleagues celebrated passing the APC to become Chartered Quantity Surveyors.

# Working with you wherever you are

With staff located across Europe, MENA, Asia Pacific and the Americas, our reach is truly global. We have delivered projects in over 40 countries and are always exploring new areas of opportunity. We offer first-class consultancy on major projects across 13 specialist sectors, and we have developed a broad portfolio of innovative projects in every region.

## Our offices

Commercial Development

Commercial Fit-Out

Data Centres

Education

Food and Beverage

Healthcare

High-Tech Industrial

Hospitality

Life Sciences

Residential

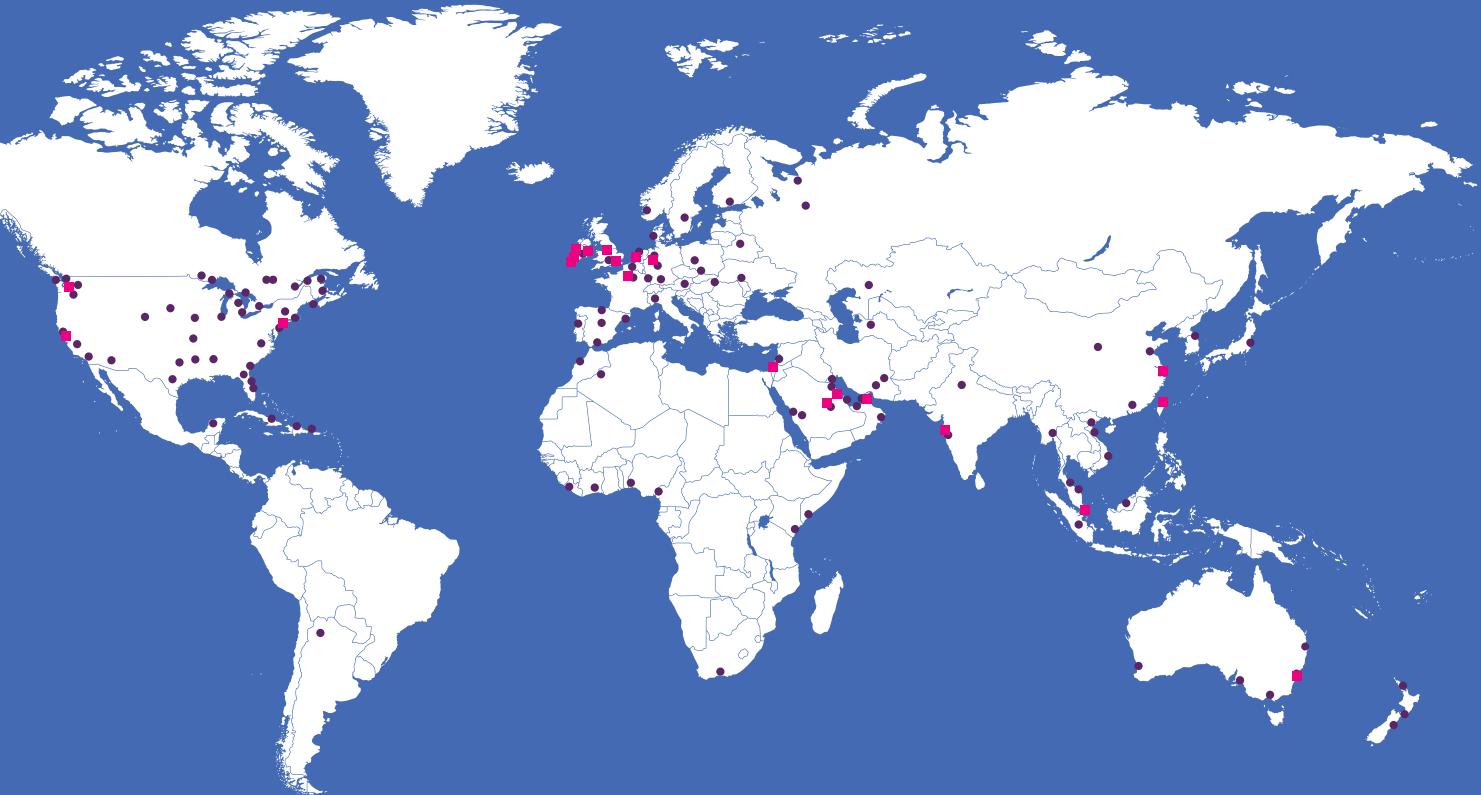
Retail

Student Accommodation

Transportation and Infrastructure

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21  
offices

150+  
project locations

## Acknowledgements

A special thank you to all those involved in this year's publication.

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**Eoin Byrne** is an Associate at Linesight, providing cost management services in the data centre sector. Based in Sacramento, Eoin is a Chartered Surveyor with over nine years' professional experience in construction cost and project management.

**Damien Coffey** is a Director of Project Management at Linesight. Based in San Francisco, Damien has over 35 years' experience across a variety of sectors working on a diverse range of projects, including data centres, mixed-use and leisure developments.

**Frances Graham** is a Project Director at Linesight. Based in New York, Frances has over 35 years' experience in the architecture and construction industry. With significant experience in the Retail sector, she holds the LEED AP Interior Design and Construction credential, as well as being well-versed on WELL.

**Kim Hegarty** is an Associate Director at Linesight, providing cost management services across a variety of sectors. Based in Dublin, Kim is a Chartered Surveyor with over 25 years' industry experience with particular experience in commercial projects, both shell and core, and fit-out.

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