

Sky-high Risk: The Impact of Increasing Tall Tower Construction in the Middle East





CONTENTS

- 3 Introduction
- 6 Rising Heights, Rising Risks
- 8 Heightened Risk Mitigation
- 12 Mitigating And Transferring Tall Building Risks
- 13 Conclusion
- 14 About Marsh
- 14 About This report

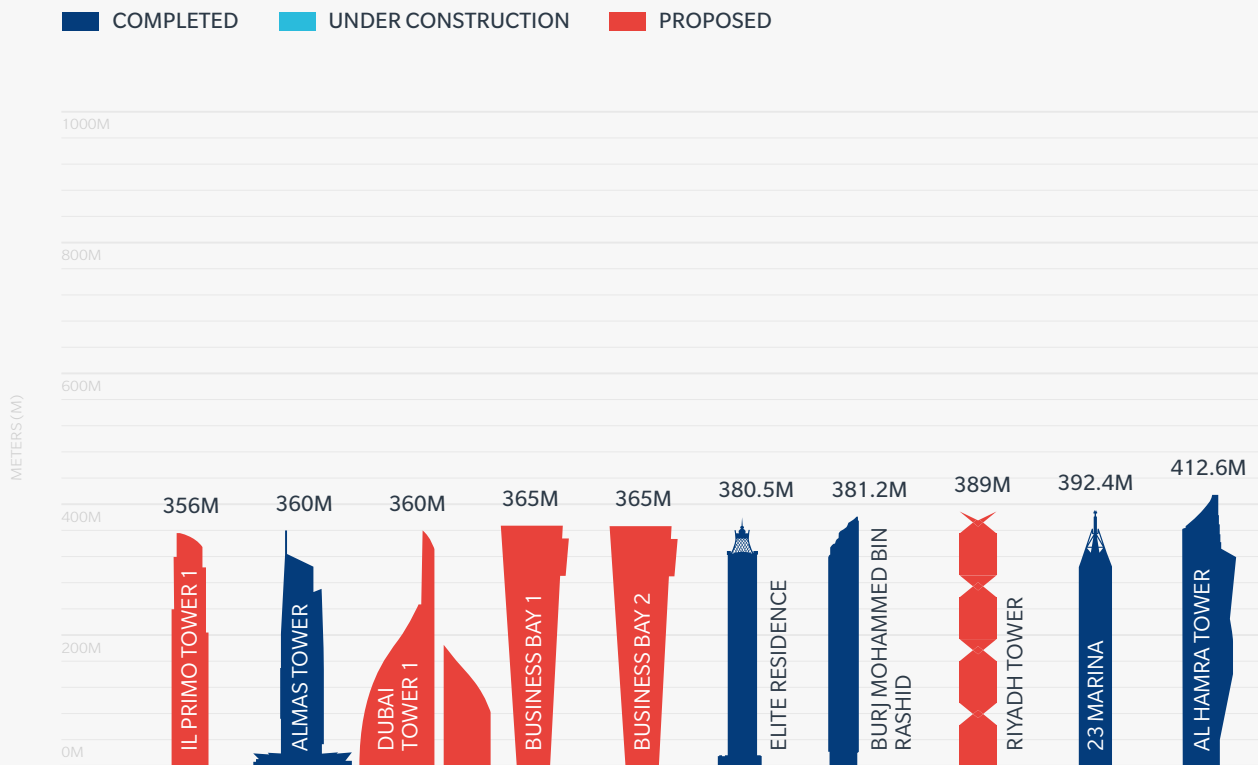
INTRODUCTION

Skylines across the globe have been rising considerably over the past decade. One region where this trend towards taller construction has been particularly visible is in the Middle East. In recent years, the region has become the home to some of the tallest buildings in the world, and recently announced projects show that this trend is not stopping in the near future. With tall building projects skyrocketing, the monumental risks involved in constructing these projects must be considered carefully. Tall building projects are complex and represent a huge concentration of assets, and, if something does go wrong, it could lead to high costs for project developers.

FIGURE 1 The Middle East’s tallest buildings (completed and planned)
 Source: Skyscraper Center

The graphic below (FIGURE 1) shows a selection of the tallest completed, under construction, and proposed buildings in the Middle East. Out of these buildings, 12 are proposed or under construction, demonstrating how skylines in these countries are set to reach new heights over the next decade, maintaining the growing trend towards tall tower construction.

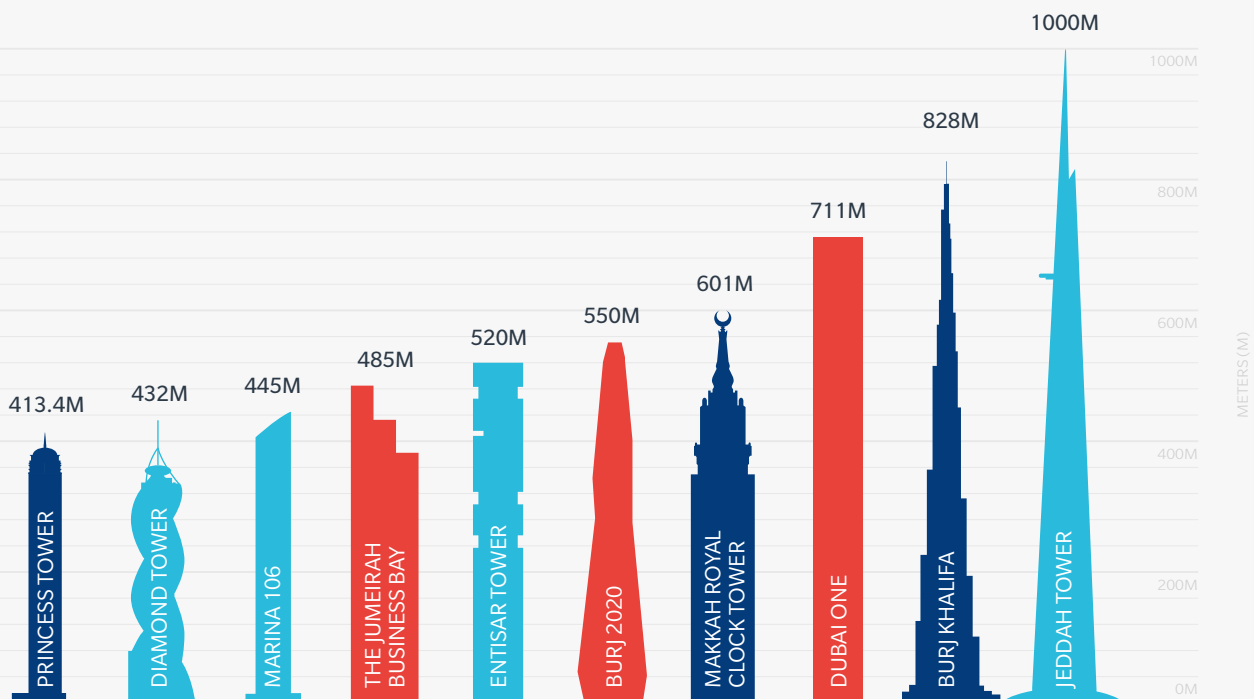
The region remained largely unchanged during the 1980s and 1990s, with only the Burj Al Arab (UAE), the Baynunah Hilton Tower (UAE), and the Al Attar Business Tower (UAE) being completed at a height of more than 150 meters. In contrast, since 2000, 276 buildings with a height of 150 meters or more have been built in the region, with a further 50 under construction and due for completion over the coming years.



The Burj Khalifa in the UAE is currently the region's tallest building standing at around 828 meters, followed by the Makkah Royal Clock Tower in Saudi Arabia, and the Princess Tower in the UAE. The Jeddah Tower, which is currently under construction in Saudi Arabia, will be the tallest building in the world when completed.

While this massive increase has centred in Dubai, by the end of 2017, more than 16 cities in 8 countries in the region will have completed a building of 150 meters or taller. However, new construction opportunities available to build higher than ever put greater focus on the need to mitigate the associated risks as the Middle East plans its high-rise revolution.*

* Note: Listed data for proposed or under construction buildings is based on information currently available. This data is subject to change until the building has been completed and does not include proposed buildings without confirmed height estimates.



RISING HEIGHTS, RISING RISKS

In the Middle East, increased investment in the region has led to rapid economic development. Construction projects for tall towers in the region have increased considerably, with all of the 25 tallest towers in the region built within the past 20 years¹.

The decline in oil price has seen a reduction in the number of projects recently. However, we are continuing to see governments spending significant sums on infrastructure. Some activity has been fueled by the Qatar World Cup in 2022 and Dubai Expo 2020, therefore, projects are needed to make sure the right infrastructure and accommodation is in place to make both events a success. In addition, Dubai’s Vision 2030 is likely to continue to drive investment in the coming decade.

While the new builds are providing much-needed space for residents and offices in the rapidly expanding region, building upwards is not without considerable risk.

Constructing a tall tower is complicated, heightening many traditional construction risks and presenting a unique set of altogether new ones. Property developers need to be aware of the risks linked with tall tower construction and take steps to mitigate losses that could occur.

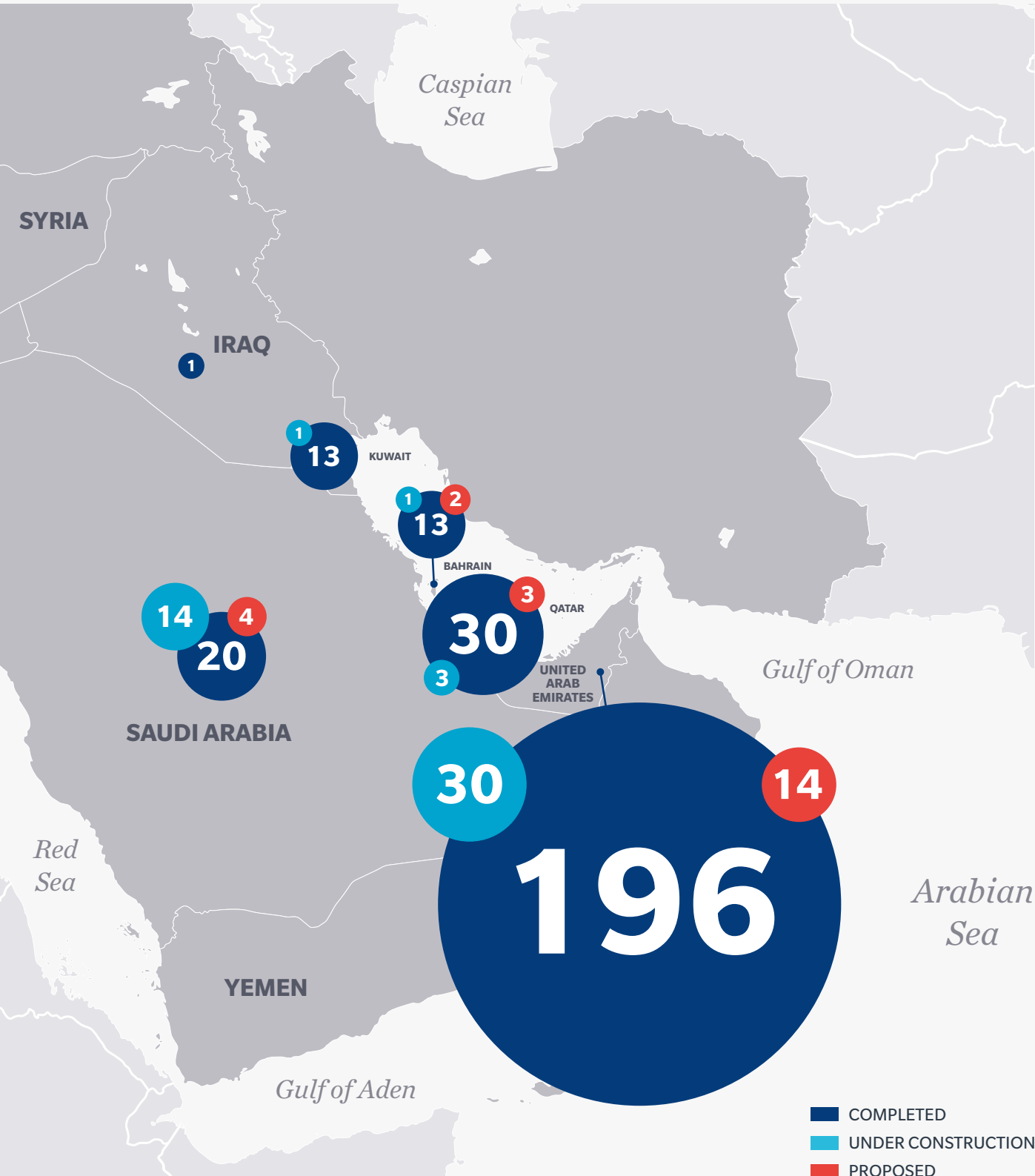
The risks of constructing these towers are two-fold for property developers. It is not just the number of these projects that needs to be taken into consideration, but also the fact that the height of the individual buildings is rising. For example, out of the top-25 tallest buildings in the region, 22 were built in the past 10 years. Many buildings that are planned or currently under construction are following the same trend, with 26 supertall or mega-tall buildings planned or under construction in the region.

FIGURE 2 Locations of the Middle East’s tallest buildings
Source: Skyscraper Center



	COMPLETED		UNDER CONSTRUCTION		PROPOSED	
UNITED ARAB EMIRATES	ABU DHABI	31	DUBAI	30	DUBAI	14
	AJMAN	1				
	AL FUJAYRAH	2				
	DUBAI	154				
	SHARJAH	8				
BAHRAIN	MANAMA	13	MANAMA	1	MANAMA	2
IRAQ	SULAYMANIYAH	1	-	-	-	-
JORDAN	AMMAN	1	-	-	-	-
KUWAIT	KUWAIT CITY	13	KUWAIT CITY	1	-	-
LEBANON	BEIRUT	2	BEIRUT	1	BEIRUT	2
QATAR	DOHA	30	DOHA	3	DOHA	3
SAUDI ARABIA	AL KHOBAR	1	DAMMAN	1	JEDDAH	1
	JEDDAH	4	JEDDAH	9	RIYADH	3
	MECCA	7	MECCA	3		
	RIYADH	8	RIYADH	1		

s (completed, planned, and under construction)



HEIGHTENED RISK MITIGATION

The increasing number of tall towers has given rise to certain perils before, during, and after construction. There are several risk and insurance challenges that developers and contractors need to consider and potentially transfer via insurance to remove unnecessary risk from the balance sheet:

FIRE AND/OR ESCAPE OF WATER

The possibility of fire and/or the escape of water represent significant risks to a project's practical completion date. Either one of these events has the potential to cause severe damage to the works and significant delays. This risk is multiplied in a tall tower, due to the high concentration of value in a single structure.

The risk of fire in the construction of tall buildings can be challenging to mitigate, as the added height can make fires more difficult to put out. In addition, completed fire mitigation systems, such as sprinklers, are unlikely to yet be in place.

One concern has been the materials used in façade construction. Due to the harsh climate in the region, façade insulation is generally required to minimize cooling loss from inside the building.

Until recently, a variety of combustible materials were used for this purpose. While recent code changes have dictated that flame retardant materials must be used to help mitigate the risk of a building quickly going up in flames, once the project reaches a certain height, firefighters could be unable to access the upper levels.

When buildings are under construction, fires are a risk at all stages. The formwork and falsework, the variety of flammable oils used (including lubes, concrete curing materials, and hydraulic and diesel fuel), and the temporary storage of large amounts of carpets, furniture, and construction huts can lead to intense fires, which can be challenging for the local civil defence.

Meanwhile, the escape of water, especially during the installation and testing phase of bathrooms, washrooms, and sprinkler systems, can cause substantial claims if leaks go undetected, as water damage can impact several floors of the building and potentially damage equipment, such as generators and cables located in basements.



SPOTLIGHT

Fire risk in tall towers

Fire risk is compounded in a tall building structure and can be a risk during the construction phase. Several tall tower projects have gone up in flames in Dubai, possibly as a result of flammable building materials. In August 2016, a fire broke out on the top floors of one of the city's towers that was under construction. Jumeirah Village Circle, the 60-storey project, sustained considerable damage as a result.

The fire was the latest of several fire incidents in UAE tall towers over the past year, including Dubai's Sulafa Tower in July and a tower in Ajman in March. Some reports have linked the fires to a type of building material used in the cladding of some tall towers in the region. In addition to the high concentration of assets in a tall tower, the soaring height of these buildings presents an additional fire risk, as many floors are out of reach of conventional firefighting equipment.

TERRORISM

The risk of terrorist attacks is growing globally. Construction sites can be targeted by terrorists, and therefore strong consideration needs to be given in respect of terrorism insurance to reinstate the construction works in the event of a terrorist act. Tall buildings also carry a concentration risk, as they are typically located in urban areas, meaning there is a greater risk of damage to property and injury to people due to falling debris.

High-rise buildings combine several attributes which can make them the prime target for a terrorist attack, including:

- They are usually in densely populated cities.
- They tend to be iconic, high-profile towers.
- They have a high asset value.
- They have the potential to contain a large number of people at any one time.

In the wake of September 11, 2001, skyscrapers suddenly felt like targets. Consequently, there was a re-evaluation of certain design aspects, resulting in high-profile buildings being built in key locations undergoing structural changes in order to minimize damage and

avoid progressive collapse if hit by a terrorist attack. The onus is on building owners, architects, and engineers to provide improved fire-proofing and more easily accessible evacuation routes.

Developers need to properly consider protecting their assets with adequate site safety and security. The safety of workers on a building under construction is also of paramount importance. Contractors will likely have a large number of workers on site at any one time and therefore need to think carefully about adequate safety measures and what to do in response to terrorist threats.

FLIGHT RISKS

While planning would need to have taken into consideration existing flight paths, objects such as construction cranes or antennae could pose risks to aircraft, particularly as buildings become taller.

Care should be taken to make sure the required aviation lights are used on cranes, and any antennae or mast on top of the building is required to be painted red and white to act as a daylight aviation warning.

There are height restrictions for buildings on the approach paths of all airports. This height limit has an error margin for poles, TV and mobile antennas, cranes etc. Supertall buildings, such as Burj Khalifa and the planned Jeddah Tower, and similar new projects, are hundreds of meters high, yet have been planned not to get in the way of flight paths. However, adding an extra 10 meters for tower cranes during construction has the potential to get in the way of flight paths.

Developers working on a project that is in its conceptual stage should have been consulting with the proper authorities having jurisdiction (AHJ) (for example, the country's or city's civil, military, or aviation authorities) to ascertain if their project will meet the requirements of the AHJ and not intrude into restricted airspace and create an obstacle for aircraft. This will usually involve submitting conceptual drawings of the plan and elevation to the authorities for review and approval, and following these plans through to completion.

INHERENT DEFECTS

These are defects discovered after the completion of the project, once the building is operational. Developers must consider inherent risks, as there can be significant balance sheet exposure if these defects manifest themselves. There are specific policies available in the insurance market that can provide indemnity for the cost of repairs if a latent defect is found. Quality of construction can be a concern for developers in this region, therefore heightening the need for consideration of this risk and its implications.

As buildings become taller, and heavier, defects could occur in the foundations of a building if they are not properly laid. This could cause dangerous sinking and tilting, and render the building unusable.

DELAY

Whether a development project will be finished on time is often questioned throughout the construction phase. The financial consequence of a delay in completion can be colossal. The more complex the project, the more likely, and costly, a delay would be. Such a delay could result in loss of revenue, continuing debt service payments, and, in some cases, the cost of alternative accommodation. We recommend that strong consideration is given to delay in start-up insurance to provide consequential financial loss cover in the event of a delay taking place.

Contractor insolvency also carries a delay risk due to the additional time and costs involved in securing another contractor. While the exposed contract works will often be covered under a project insurance policy, the increased costs and resulting time delays can be uninsurable.

MARINE CARGO INSURANCE

With tall tower projects, the risks around shipping large amounts of materials used in construction also need to be considered.

For the projects taking place in the Middle East, much of the material is being shipped in from abroad. Traditionally, with onshore construction policies, the transport of items that are purchased outside of the country where the project is being built is not automatically covered. The inland transit limit in policies usually includes transits between site and offsite storage areas and pre-fabrication sites, as well as cover for those items which are procured within the country where the site is located.

If there are items being purchased outside of territory, marine cargo insurance should be considered. A marine cargo policy provides coverage for all internationally sourced material to the final project site. This coverage will attach from when the materials leave the manufacturers, and continue through loading, marine transit, unloading, and intermediate storage (subject to a maximum period of 60 or 90 days), through to inland transit until arrival at the project site.



SPOTLIGHT

Sinking towers

While it appears that the projects going ahead in this region at present are being built on carefully considered foundations, there have been cases of unexpected sinking in towers in other parts of the world. A prime example is the tilting and sinking of the 58-storey Millennium Tower in San Francisco². The building is believed to have sunk as much as 16 inches and tilted as much as two inches to the west since its completion in 2008, believed to be a result of ill-considered foundations, greatly devaluing the properties inside.



SPOTLIGHT

Cladding/facades

Developers have become increasingly concerned about inherent defect risks, especially regarding curtain wall facades, cladding, and double glazing failures. These items may be manufactured around the world and are unique, made-to-measure pieces, which are assembled on site. Once the building is complete and operational, if these critical items/components fail, the developer could be presented with an enormous unforeseen cost to repair the damage (especially if there is no recourse against the manufacturer/contractor and/or they are now no longer trading). Even if there is recourse, these claims are likely to be tied up in court for years, and suing overseas companies in certain territories can be difficult. In the event of these failures and others, inherent defects insurance does provide long-term balance sheet protection. The policy will step into the shoes of the developer, repair the issue, and then try to subrogate from the relevant contractors, sub-contractors, manufacturers, and consultants.

PROXIMITY TO THIRD PARTIES

While litigation in the Middle East is generally less common in this region compared to Europe or the US, third-party risks should be considered and mitigated against for building projects in this region.

These projects generally involve working within tight building

sites in densely populated urban areas, which are in close vicinity to third parties. As a result, there are heightened risks to people, neighbouring properties, and businesses, and therefore consideration needs to be given to third-party liability limits of indemnity.

NATURAL PERILS

There is limited natural peril exposure in the Middle East; however, projects under construction are more vulnerable to damage from these than completed projects.

The region has some limited exposure to earthquakes, although, in most countries, buildings are required to be designed to withstand some seismic activity.

Windstorms and sandstorms are common in the region; however, the threat to building projects is limited.

Oman is vulnerable to cyclones, although the country has not seen the proliferation of tall building projects as seen in many other countries in the region.

SUPERTALL AND MEGATALL BUILDINGS PRESENT NEW RISKS

An increasing number of buildings being constructed in the Middle East fall into the “supertall” category of buildings taller than 300 meters, or megatall buildings, defined as those in excess of 600 meters³.

The race seems to be on to claim the title of “world’s tallest building”, as plans for the Jeddah Tower in Saudi Arabia look to dwarf the current record holder, UAE’s Burj Khalifa, (when it is completed, it will reach a kilometer in height). Meanwhile, plans for an even taller building have been unveiled in Iraq. As the height of the buildings rise, the risks increase, and become more complex.

As discussed, fire remains the foremost risk concern for these structures, with the risk multiplied as the height of the construction project rises. In addition, the strength of building materials is a big issue for megatall structures (for example, concrete traditionally

has only compressive strengths around 40MPa - 60MPa but this has increased to upwards of 120MPa - 150MPa). These technologies have been particularly developed and improved in the last two to three decades, due to increased demand.

Other major challenges include the transport of building materials to such high elevations during construction. For example, the use of tower cranes and the pumping of wet concrete to such heights has limitations and requires careful planning and engineering. Even site traffic management becomes a risk issue for megatall building sites, increasing defect and liability risks.

The question is, as buildings race to greater heights, being built faster than ever, have structural risks and possible defects (such as buildings sinking under increasingly greater weight) been properly considered?

MITIGATING AND TRANSFERRING TALL BUILDING RISKS

The risks around tall building construction are often greater than other projects due to the complexities around working at height, the concentration of high-value assets, and location in urban areas.

While risk mitigation measures should be taken before and during the project to reduce the chance it will fall afoul of the risks discussed, insurance solutions are available to cover any of these risks. Transferring the risks and removing them from the balance sheet is an efficient use of capital and a sound risk management strategy; however, it is important to ensure the building contracts and sub-contracts reflect the strategy in terms of insurance.

Some of the risks discussed in this paper, such as flight risks and inherent defects, may be excluded from standard policies; therefore, consideration for additional policies to fill in the gaps is needed. Some types of insurance coverage that may be considered for the risks associated with tall building construction projects include (but are not limited to):

- Construction all risks.
- Third-party liability/non-negligent indemnity.
- Delay in start-up.
- Terrorism.
- Environmental liability.
- Latent/inherent defect cover.
- Marine cargo.

The construction insurance market, like much of the insurance industry, remains awash with capacity, and is currently a buyers' marketplace for solutions to the challenges discussed within this paper. Given the options available within the insurance market, careful consideration ought to be given to the risks that may affect a tall building project, particularly those located in high-density areas or near critical infrastructure.

As construction techniques improve and safer construction methods are developed, insurers' appetite continues to be strong for tall building projects. As a minimum, we would expect all projects to carry good quality construction all risks coverage and not to contain a "conditions precedent" warranty that serves to render the coverage inoperable or unusable.

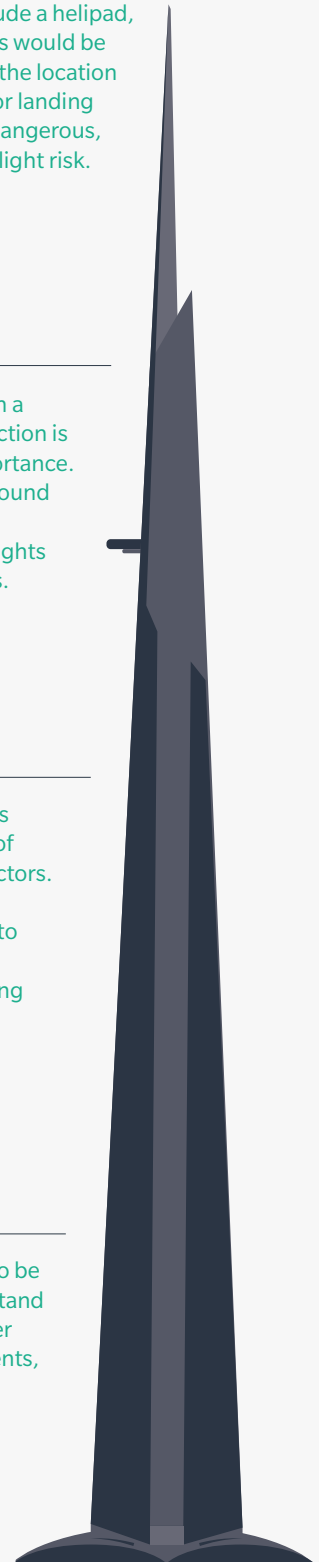
FIGURE 3 Assessing the key risks associated with the world's tallest building
Source: Marsh

Initial designs may include a helipad, however, further studies would be needed to determine if the location would make taking off or landing maneuvers extremely dangerous, presenting too great a flight risk.

The safety of workers on a building under construction is also of paramount importance. Technical challenges around pumping and placing concrete at extreme heights present new challenges.

Highly complex projects can involve thousands of workers and subcontractors. Contractor insolvency carries a delay risk due to the additional time and costs involved in securing another contractor.

The foundations need to be strong enough to withstand an earthquake and other natural catastrophe events, such as flooding.



CONCLUSION

As growth continues in the Middle East, the upward trend of construction projects to provide increased residential, office, infrastructure, and hospitality space is likely to continue. While it appears the sky is the limit for construction in the region, project developers must take into consideration the increasing risks that come with building ever upwards and take the appropriate steps to mitigate against these.



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About this report

This report was produced by Marsh's Global Construction Practice, which is at the forefront of advising the construction industry on risk and insurance issues and has a reputation for delivering insight and solutions for the challenges that our clients face. Marsh's Global Construction Practice are experts in risk management and have considerable experience placing tall tower construction projects throughout the world, including working with overseas developers.

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