



# Challenges facing the M&E sector in the design and delivery of high rise buildings

**Uponor**

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Executive summary	4
Part One: Fail to prepare, prepare to fail	8
Part Two: Breaking specification	10
Part Three: Plugging the gap	12
Part Four: Optimum performance	15
Conclusions	16
References and thanks	17

It is predicted the UK population will reach 67 million by 2020. In another thirty years, it is expected to have reached more than 77 million. Of these, 68 per cent will live in urban areas, the skylines of which will be dominated by high rise buildings. In the Middle East, living and working in buildings that are getting higher and higher in stature is an aspiration; in the UK, we've been slow to embrace this trend, instead seeing the surge in high rise buildings as a necessary manoeuvre to solve a major housing crisis.

The latest London Tall Buildings Survey from the NLA showed that major clusters of tall buildings have rapidly changed London's landscape in the past few years; the capital alone needs an additional 110,000 homes to be built by 2030 to cater for its ever-expanding population. With a pipeline of over 541 tall buildings either in planning, approval or under construction, it's set to change again imminently. The same trend is being witnessed in the UK's other key cities, with Manchester's 'skyscraper alley' taking shape and huge high rise regeneration projects in Birmingham, Glasgow and Salford to name just a few. It is true, we are building faster, denser and higher – however, there is still no standardised approach to the design, construction and operation of these buildings.

Over 20 per cent of the total construction costs of high rise buildings are allocated to M&E services, yet these specialist contractors with unrivalled knowledge of the products, systems and solutions needed to achieve end user satisfaction in buildings of this kind are typically overlooked during the design and initial build stages of high rise structures.

Responsibility for the ongoing maintenance of high rise buildings is also associated with M&E, despite the pressure to create feasible, safe and affordable high rise living against increasing time constraints, nose-diving budgets and a gulf of available or emerging talent.

As buildings get higher – challenging expectations of efficiency and sustainability – and demands from end users become more sophisticated, with automation, smart technology and comfort high on the agenda, M&E specialists are being forced to adapt, taking on additional accountability to address the unique infrastructural challenges high rises present. The M&E role within the build of high rises is more in the spotlight than ever.

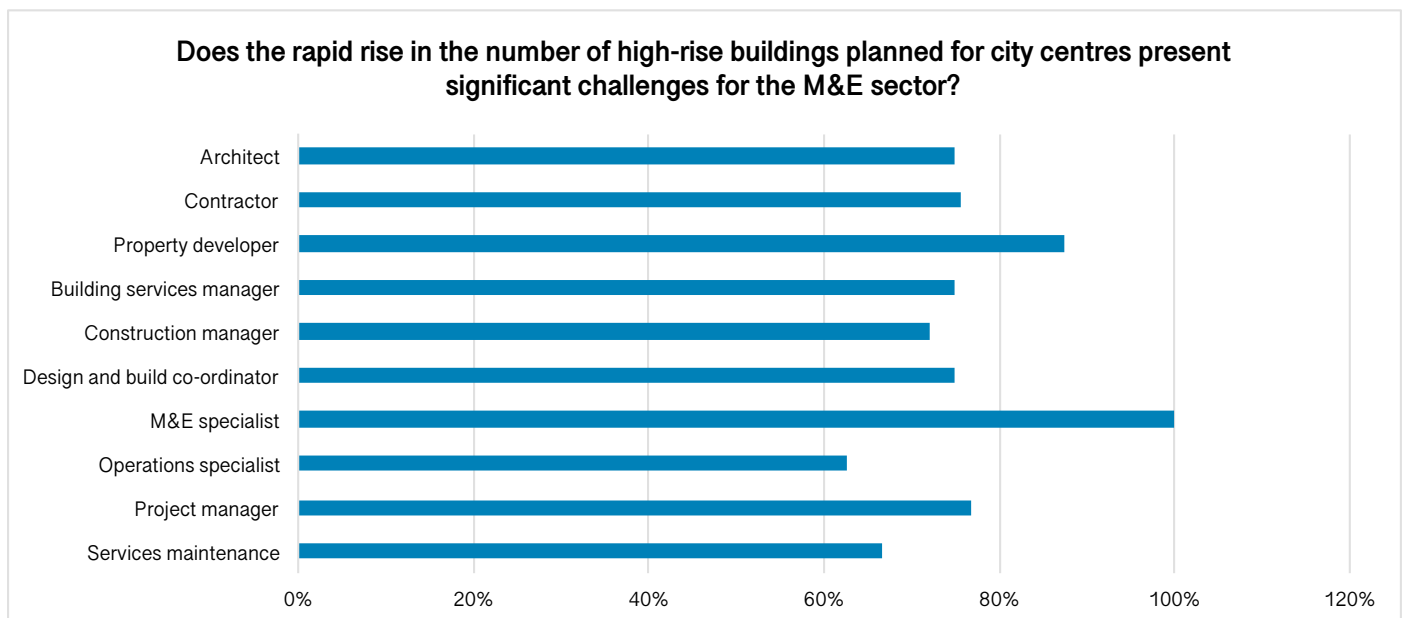


In the UK, there are just 17 high-rise buildings over 150m (492ft.) in height and just one – The Shard in London – over 300m . Recently, it played host to a group of expert M&E contractors who came together to discuss the outcomes of market research undertaken by Uponor – the total solutions provider of systems for the hygienic transportation of water around a building – exploring the challenges the sector faces amidst the surge in demand for high rise buildings.

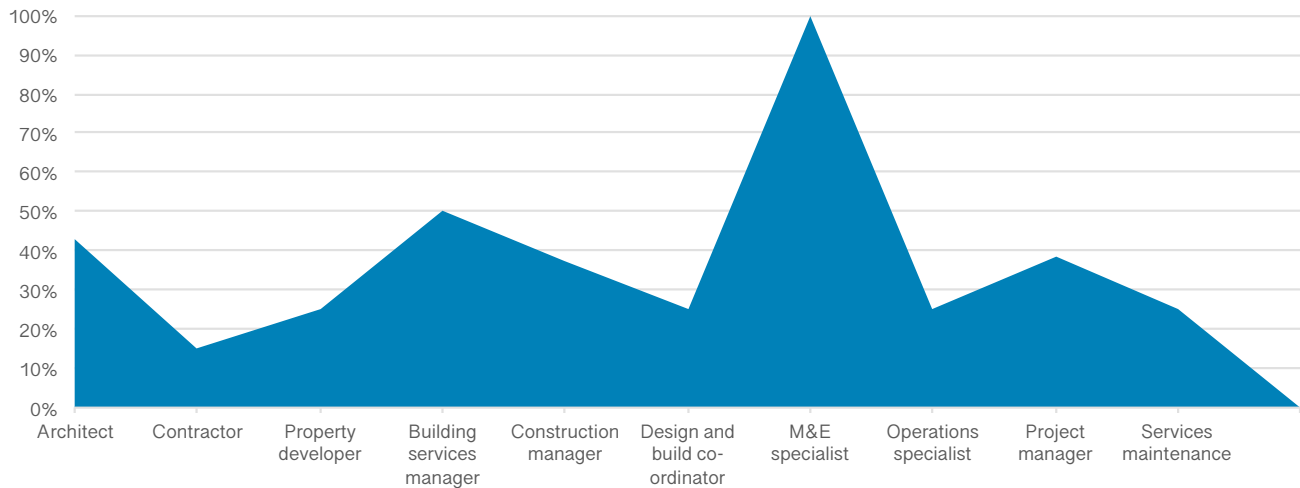
To assess the expert views of those working within the supply chain of high rise buildings on a daily basis, Uponor undertook research with 250 respondents working in the following fields:

- Architect
- Contractor
- Property developer
- Building services manager
- Construction manager
- Design & build co-ordinator
- M&E specialist (Engineer, manager, director, supervisor)
- Operations specialist (Engineer, manager, director, supervisor)
- Project manager
- Services maintenance

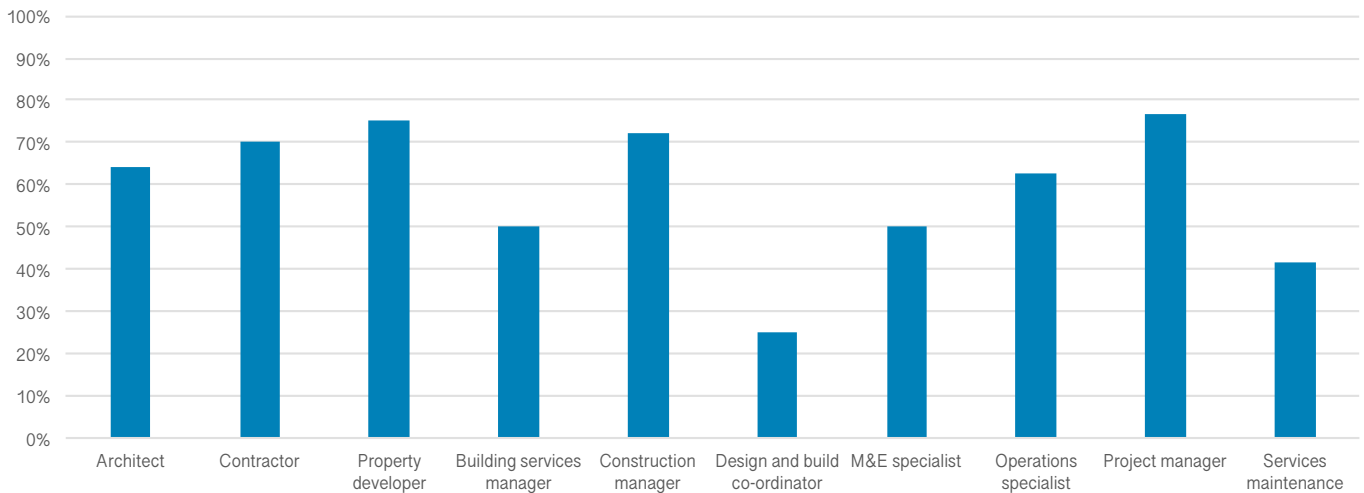
The following provides an overview of the findings of the research in three key areas:



### Do you ever break specification guidelines to generate better results for building performance and end user satisfaction?



### Once a system has been specified, M&E contractors have accountability for overall building performance. To what extent do you agree?



After collating and analysing the market research data, Uponor invited a team of M&E experts to provide their views on how the sector can deliver future high rise buildings that achieve optimum performance and end user satisfaction. As a result, Uponor was able to gain valuable insight into the challenges the construction industry faces as it plays its role in tackling the housing shortage, filling the skills gap and whether specification of high rise building is fit for purpose.

This report outlines the collective views of those experts, as well as their assessment of the research findings and personal experiences in the delivery of high rise buildings.

**We hope you find this report useful, and we would value your comments and feedback.**



## Part One: Fail to prepare, prepare to fail

Experts in the construction industry say they are not equipped for, or prepared to handle, a major housing crisis that many say can only be met by a surge in delivery of high rise buildings. Expertise, products and solutions are in place to ensure high rise buildings are sustainable, multifunctional and satisfactory for end users; however, a huge disconnect in the upfront planning and ongoing practices of the supply chain working on these buildings is delaying completion, meaning a lack of suitable spaces are being built to meet demand. Furthermore, the pressure facing M&E specialists to deliver high rises at a faster pace but with tightened budgets, is putting the usually high standards of the role in jeopardy.

The research found that:

- 85% agreed that high rise buildings are the best solution to solving a housing crisis
- Those under 35 were most likely to agree (90%) while those aged 55 and over were most likely to suggest alternative solutions
- In London specifically, 15% called for alternative solutions to meet the demand for housing
- 75% of all respondents agreed that the M&E sector will come under significant pressure to deliver amidst the rapid growth in the number of high rise buildings, with many citing cost constraints, demand of available resource and the possibility of heightened regulation as major challenges

Respondents and roundtable attendees pointed out that for high rise buildings to be seen as a viable housing option for the masses, they must cater for community facilities, not impact an already reducing amount of green space in city centres, and be compatible with wider surroundings so as to manage traffic and congestion. However, to achieve this, changes must be made at the initial design stage to ensure M&E expertise is considered and implemented to futureproof the life cycle of the buildings.



Currently, a lack of understanding as to how M&E systems work amongst those responsible for the design of high rise buildings is leading to significant delays in completion. In fact, it is becoming increasingly difficult to install efficient and sustainable water, lighting and electrical systems as buildings are not designed with these elements in mind; aesthetic appearance and integration of costly technologies is instead taking precedence.

Furthermore, there is a lack of accountability from those integral to the design process to ensure continuity throughout the build and ongoing maintenance thereafter. As a result, those working within M&E roles are pressured to take on additional responsibility, as they are tasked with delivering against plans that haven't taken their expertise into consideration. Indeed, it is becoming increasingly important to involve specialist contractors at the absolute infancy of construction, if we are to successfully design, deliver and operate tall buildings for generations to come.

**Nathan Lutz:**

“In order to get high rise buildings right, design and construction teams must walk before we attempt to run and do the basics of communication and planning correctly.”

**James Griffiths:**

“The problems we’re seeing aren’t just associated with high rise buildings; this is a problem the M&E sector encounters within every build. We are seen as one role within the whole construction, but that mentality needs breaking down; there must be group responsibility for producing high rise buildings that are fit for purpose.”

**Steve Poulter:**

“If the design of high rise buildings continues in this manner, we will see key components such as water systems and electricals being replaced within 20 years; buildings need to be created to last.”



M&E experts challenge 100 per cent of building specifications due to pressure to deliver high rise buildings to tighter time frames and lower overall costs, according to roundtable attendees. And they are not alone. A quarter of those working within other fields of construction say they too are forced to break specification in order to achieve end user comfort.

The research found that:

- Over a quarter of respondents (26%) are likely to break specification in order to improve end user experience
- 60% of those are under the age of 24, compared to just 12% of over 45s
- Within M&E roles, this rises to almost 100%
- Reasons include specification not allowing for improvement in performance, high quality finish, appropriate levels of hygiene, speed of delivery and advanced methods of installation

There is huge variance in the industry as to the level of attention that needs to be paid to intended high rise building use in order to create a well-considered specification. For many, intent forms the basis of every decision made in the specifying process, in order to create a building that is fit for purpose. For others, specification is merely a tickbox exercise bound by industry legislation and guidelines.

Furthermore, while significant attention is being paid elsewhere in the supply chain to the integration of new smart technologies deemed essential to improve end user experience, M&E specialists are more focused on using tried, tested and proven products and water, lighting and electrical systems to protect performance, hygiene levels and reduce ongoing maintenance.

For those less keen to break specification, all reasons lean towards safety and reputation. While some point to the need to stick to guidelines in order to minimise risk, protect product warranty, avoid industry fines and prevent building failure, one common response emerges: specification is there for a reason.

As we are forced to build faster and higher, agreements need to be made on what makes a perfect high rise specification – otherwise, the trend in breaking specification looks set to continue. If more money is invested at design stage – both into communication with all levels of the supply chain, and to securing contributions to BIM designs from M&E experts – there will be less inclination to break specification. It is agreed that upfront investment to get this right, down to even the smallest of components, will reduce the need to stray from specification, resulting in less compromise on aesthetics, quality and performance in the long term.





## Part Three: Plugging the gap

If rapid action isn't taken to fill a skills gap specifically in M&E, repercussions for the rest of the industry will be catastrophic, roundtable attendees agreed.

Overseas, where construction is positioned as thriving, governments are offering grants to their most skilled tradespeople, encouraging them to launch businesses in specific fields within construction, such as M&E. In the UK, there is very little exploration of these niche roles meaning they stay under the radar, typically becoming jobs young people 'fall into' rather than 'seek out'. Both in school and at home, the appeal of construction as a long-term career option has diminished compared to just a decade ago; this is despite wages in the industry rising at a faster rate than any other profession. Widespread news that the sector is struggling, and its subsequent impact on job uptake, is contributing to the slowdown in delivery of high rise buildings needed to solve the housing crisis; intake to fill the 158,000 job roles needed in the next five years to meet projected workloads is a major challenge.

The research found that:

- 20% of the industry feel young people aren't given the tools, training or responsibility to come up with modern, solution-based products, systems and methods of installation, appropriate for high rise buildings
- Those working in businesses with 100+ staff members are most likely to allow younger members of the team to design or introduce modern methods of water solution installation
- However, under 24s (66% in the South East, 75% in the South West, 75% in the Midlands and 80% in Scotland) say they aren't empowered to explore M&E, its modern ways of working, products and systems

Within M&E specifically, a gulf of talent is manifesting. Even those working within it are unsure if a platform is in place to nurture potential talent. So, who is responsible for plugging the gap?

Advances in technology that are well popularised in schools are exposing young people to the thinking behind building design (e.g. BIM), however there is still very little focus allocated to translating this to application within the construction process. Furthermore, health and safety regulations are putting blockers in place to bringing young people on to building sites, meaning vital on-the-job training required to understand the role M&E plays within the build process – impossible to emulate in schools and colleges – is severely lacking.

That said, investment into training across all professions had dropped dramatically in the last 20 years, resulting in slower productivity than other OECD (Organisation for Economic Co-operation and Development) countries. It is felt legislation such as the apprenticeship levy – introduced to create an additional 3 million apprenticeships by 2020 – is only serving to help fill roles within desk-based professions; marketing, finance, sales. Within construction and engineering, the overall life cost of an apprenticeship is still 62 per cent higher than in business administration, meaning even with the support of both the apprenticeship and CITB levies, the impact on businesses already facing pressure to squeeze costs, but remaining steadfastly focused on creating M&E specialists of the future, is more compelling than ever before.

**Steve Poulter:**

“There is a responsibility within the industry to create campaigns that grab the attention of young people; they know why jobs behind desks are safe options, let’s tell them why jobs in construction are exciting.”

**David Rodley:**

“As a consultancy we spend time with lecturers in colleges trying to encourage young people to enter the M&E market but we’re not always welcomed with open arms. That’s because apprenticeships with us pay wages, time in college doesn’t. When the wage for young people in the industry is rising, it should be seen as an attractive option but currently isn’t.”





End users are equally as responsible for achieving and maintaining optimum performance in high rise buildings as those involved in the design and build stages, but aren't willing to pay the associated costs to achieve it, according to roundtable attendees. The currently inadequate knowledge transfer on how to achieve optimum performance delivered to occupants post build needs improvement, otherwise high rise buildings will last less than a generation.

Specifically within the high rise supply chain, two thirds argue that M&E contractors have total accountability for overall building performance post build. However, M&E experts themselves argue that there is continuous pressure to focus on driving down overall build cost, leaving responsibility for performance of heating, water and electrical systems to either those involved at design stage, or the end user themselves. However, accountability at both ends of the supply chain seems to be lacking.

Additionally, while 77 per cent of respondents said products and systems created to cater for the demand in high rise buildings have shifted to accommodate changing preferences within society over the past five years – for example, automated technology, sensor-controlled water systems and eco-friendly heating – there is reluctance from occupants to pay the resulting, inflated, associated rental and maintenance costs. If this trend continues, demand for and delivery of high rise buildings will continue to rise, but 100 per cent occupancy will be unachievable.

The research also found that:

- After M&E specialists, manufacturers of products specified in the supply chain of high rise buildings are most likely to be held accountable for achieving optimum building performance
- A quarter of respondents feel current water solutions, products and systems are out of date, with the pace of NPD in the sector unable to meet the surge in demand for high rises
- 50% of respondents said too much emphasis is placed on achieving optimum temperature in high rise buildings, versus actual thermal comfort

## How do you define optimum performance?

### James Griffiths:

“An agreement between all parties as to how to keep solutions functioning at their greatest ability, resulting in positive end user experience.”

### Steve Poulter:

“It's impossible to define; the closest you can get is asking the developer what their ultimate goal is, and within what time – if you achieve that, you're close to optimum performance.”

### Nathan Lutz:

“We need to take a step back and look at how people want to use their spaces, then see how these uses can complement each other before we can finally apply the right products and solutions to make designs as streamlined and easy as possible.”

It is entirely possible that the true extent of the housing crisis may not yet be realised. It is said that every five years, the average living age increases by a year, meaning not only is our population growing but we need homes for longer. But as ambitions for high rise buildings become greater, offering more accommodation options as storey numbers increase, a one size fits all approach cannot be applied to their design and construction; the building size, occupancy and end use, amongst other things, all must be considered before pen is put to paper, let alone before ground is broken.

The overriding outcome of our market research and the expert opinions of those who contributed to this report is that to futureproof the vital systems powering the UK's high rise buildings, M&E should become embedded in the initial design process, and considered at every stage of construction. If this doesn't change, we anticipate seeing show stopping examples of high rise architecture have their utilities, such as plumbing and heating systems, fail within just 20 years.

To solve this issue, we will be partnering with M&E specialists working on high rises to ensure efficient, sustainable water solutions are specified at design stage, meaning the UK's skyscrapers can begin setting an example in how it should be done, all around the world.

## **We hope you've found this report useful.**

To discuss the information contained within it further, or comment on the findings, please get in touch by emailing [marketing.uk@uponor.com](mailto:marketing.uk@uponor.com) or calling 01923 927 000. You can visit our website ([www.uponor.co.uk](http://www.uponor.co.uk)) for more information on our services, systems and solutions.



With special thanks to Steven Poulter (LJJ Mechanical and Electrical Contractors), David Rodley (LJJ Mechanical and Electrical Contractors), Nathan Lutz (SES Engineering Services) and James Griffiths (Uponor) for taking part in roundtable discussions. Please note that this whitepaper does not express the personal views of each practice. Where roundtable attendees are quoted, views represented are those of the individual, not the practice as a whole.

## Resources:

- [http://www.modbs.co.uk/news/archivestory.php/aid/17134/Early\\_specialist\\_support\\_crucial\\_for\\_tall\\_buildings.html](http://www.modbs.co.uk/news/archivestory.php/aid/17134/Early_specialist_support_crucial_for_tall_buildings.html)
- <https://www.thenbs.com/knowledge/the-role-of-a-specification-in-ensuring-design-intent-a-manufacturers-view>
- <https://www.constructionnews.co.uk/best-practice/skills/rising-stars-how-we-can-tackle-the-skills-gap/10031660.article>
- <https://www.thenbs.com/knowledge/the-apprenticeship-levy-and-the-construction-industry>
- [https://warwick.ac.uk/fac/soc/ier/publications/2003/hogarth\\_and\\_hasluck\\_2003\\_rr418.pdf](https://warwick.ac.uk/fac/soc/ier/publications/2003/hogarth_and_hasluck_2003_rr418.pdf)
- <https://www.cibsejournal.com/news/engineer-wages-up-by-5-on-back-of-skills-shortage/>
- <https://www.constructionnews.co.uk/best-practice/skills/rising-stars-how-we-can-tackle-the-skills-gap/10031660.article>
- <https://buildingproducts.co.uk/uk-sees-increase-number-high-rise-buildings/>
- <https://www.statista.com/statistics/604263/uk-cities-with-most-highrise-buildings/>
- <https://www.dezeen.com/2018/04/18/new-london-architecture-nla-survey-tall-buildings-report-survey-uk/>
- <https://www.istructe.org/blog/2014/what-are-the-challenges-to-super-tall-construction>
- <https://www.projectlink.com.au/blog/emerging-high-rise-design-trends/>
- <http://www.wsp-pb.com/en/High-Rise/High-Rise-Insights/Millennial-Lifestyle-Is-Setting-New-Trends-in-High-Rise-Development/>
- <http://www.cityam.com/221125/population-growth-uk-become-biggest-country-european-union-2050>
- <https://www.building.co.uk/cost-data/specialist-costs-mande/5020698.article>
- <https://www.newlondonarchitecture.org/news/2018/april-2018/press-release-nla-london-tall-buildings-survey>
- <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>
- <https://www.theguardian.com/business/2019/mar/05/tall-buildings-london-skyline-2019>

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