House of Lords Build Environment Committee.
Short Inquiry: MMC (Modern Methods of Construction) Consultation

NFCC's position statement on MMC sets out our broad concerns regarding this emerging area of construction. The overarching concern for the sector is the lack of understanding about the fire related performance of MMC which presents significant uncertainty and caution in the built environment.

NFCC recognizes that MMC sits within a broader context of work to reform the construction industry, with a focus on greater productivity and innovation with joint strategic leadership from DLUHC and Homes England.

Traditional onsite building methods and materials are being set alongside alternative processes and products commonly known as MMC. As the nature of buildings evolves, this industry movement has ramifications for fire safety. The NFCC want to ensure that the safety of people living in the buildings, and firefighters expected to respond to incidents in the buildings, is not being compromised.

There has been significant progress in driving MMC from a national perspective since the Farmer Review (2016) which set out the sector's challenges which included obstacles to proving business and benefit cases for MMC without the substantial support of government and highlighted that immaturity in key business case areas was likely to have a significant impact on fire related risks for MMC constructed buildings. These challenges are still relevant 7 years later.

NFCC have been vocal about long held concerns with design and construction of buildings using more established construction methods and materials, MMC therefore introduces additional complexity and presents a challenge for traditional building regulatory approaches. Inspecting and verifying construction at many points of the construction process becomes even more challenging, and performance concerns arise for meeting the fire safety objectives of the final building.

With the growing use of MMC, and fire safety [1]still considered relatively late in the design process, additional regulatory guidance and oversight may be warranted to help increase confidence in the performance of modular buildings from a fire performance perspective. This might include the development of design and installation guidance, as well as regulatory review, inspection, and approval guidance.

To build and maintain confidence among all fire stakeholders, the sector must be enabled to demonstrate the safety of MMC technologies by ensuring that the regulatory framework keeps pace with innovation.

What are the fire-related risks related to MMC? Do different categories of MMC come with greater risks than others and how is this assessed?

The categories of MMC are established in the MMC definition framework. 'MMC' is a catch all term that indicates a range of *off-site manufacturing* and *on-site techniques* that provide alternatives to traditional housebuilding methods. The term embraces a variety of approaches, and its definition has varied over the years with numerous associations. The term MMC covers a wide range of construction methods and materials. Given the number of permutations it's not as simple as saying certain categories come with greater risk. NFCC supports proper scrutiny of all MMC but hold particular concern around the following (especially when in use for high-rise buildings; buildings with vulnerable people; and buildings with a stay put evacuation strategy):

- 3D Modular (Volumetric) construction - Category 1 of the MMC Definitions Framework; and
- Buildings with combustible structures. This includes buildings constructed using both engineered mass timber products e.g., Cross-Laminated Timber (CLT); Glue Laminate Timber (Glulam) and other timber products.

Category 1-3

NFCC are concerned about Category 1, 3D modular construction, which represents the starkest shift away from the processes associated with traditional construction with a much higher proportion of the 'construction' taking place off-site. At one end of the Category 1 spectrum there are highly automated factories manufacturing modular units whilst at the other end, there is a "construction under the roof" system, where a manual workforce is constructing part of the building off-site, albeit in a way that would be like that of an on-site work force. Notwithstanding the above, the nature of modular construction brings with it specific fire safety concerns:

- **Structural Fire Performance** - When constructing a building using modules it's not clear how it is assessed for structural safety. The structural performance will often rely on the connections between adjacent modules, both vertically and horizontally, and there is lack of understanding of what this looks like and how it would perform in the event of a fire.
- **Unseen fire spread** – When modules are brought to site and craned into position, the 3D modules will likely have voids that can create potential unseen travel paths for fire and smoke. Whilst it's acknowledged that similar problems can exist in some non-modular buildings, concerns around firestopping and cavity barriers are a sector wide issue, it's an issue and particularly relevant to MMC. These issues also serve to compound the concern around structural fire performance above.

Although the categories of MMC are defined by processes and not materials, NFCC are also concerned about the increased use of combustible structures in buildings where there will be prolonged evacuation times. The use of timber (in its various forms) as part of the structural frame would be covered by categories 1, 2 or 3 of the MMC framework. The fire at the timber framed[2] Beechmere Retirement Village in Crewe in 2019 resulted in the complete destruction of dozens of homes, though luckily due to various differing factors including swift intervention by Fire and Rescue Service, nobody was injured. It is highly unlikely the fire would have spread in the way that it did, had it been constructed using traditional masonry materials. Fires like this must be prevented, NFCC are not aware of any changes or new measures to address and prevent similar fires like Beechmere occurring again in the future.

Category 4 – 7

The MMC framework, and all of its categories, are intended to reflect the changing way buildings are designed and constructed and categories 4 – 7 represent a catch all for building parts and processes that don't represent the primary structure. Although NFCC don't hold specific concerns with relation to these categories, given we continue to hold concerns around the standards of building construction using more established processes, and the litany of building defects that are continuing to be uncovered, we are wary of the potential for future legacy issues brought about by alternative construction processes associated within these categories.

What would make you more confident in the fire safety of MMC-delivered buildings?

There needs to be more guidance setting out how to design and build an MMC building with fire safety in mind which is underpinned by robust independent testing and research to help confidence in the drive to increase the use of MMC.

For new buildings, Approved Document B (ADB) is the primary fire safety design guidance for common building situations. Last summer, the government published a FAQ in relation to ADB and attempted to address the issue of whether it could be applied to buildings constructed using modular units or combustible structures (timber). Whilst the advice was that it should not be used in "tall, large or complex buildings", this appears to imply that it is ok to use them for smaller buildings. Though it is our understanding anecdotally that MMC is not applicable at all within ADB, and we do need clear and concise clarification on this matter.

Whilst NFCC acknowledges the reduced level of risk associated with smaller buildings, it should be highlighted that ADB as it currently stands does not address any of the specific challenges associated with certain types of MMC. ADB is intended to be used for common buildings situations, however it should be acknowledged that certain types of MMC are already very common (e.g., timber frame), and going forward, the use of other types of MMC is only going to increase (e.g. modular) therefore there should be statutory guidance available to support this.

As it currently stands, due to the lack of statuary guidance, the modular sector comes across as fragmented with manufacturers taking their own approaches to demonstrate compliance and safety. Whilst there is scope for the modular sector to work together more to establish their own standards and best practice (if they haven't done so already), government must take a more active role in supporting developers to assist and give confidence to wider sector stakeholders (e.g. regulators).

MMC is used in the US and Europe, and while we have imported the techniques, we have not imported the safety measures that are deemed appropriate to support its use, such as sprinklers in the US are present in all but single residencies built using timber frame.

NFCC are aware and are involved in the development of PAS 8700 - Modern methods of construction: offsite construction of residential buildings which represents a positive step forward in terms of addressing some of the concerns that continue to undermine confidence in MMC (not just fire safety). However, given the breadth of what constitutes MMC, the intended scope of the standard, and the relatively short timescale to publication, NFCC hold reservations that a single standard will be able to address our concerns.

NFCC is committed to working with government and sector partners to better understand, develop and accelerate an evidence base to support the use of MMC. NFCC are aware of some research being undertaken as part of the ADB review which might support this work although MMC is not the focal point.

The lack of long-term data on the performance of MMC in relation to fire safety has been raised as an issue – how much and what types of data would you need?

As previously discussed, concerns around MMC overlaps between different categories and materials, and the knowledge gaps are areas which more consistently recorded data can help address.

In the case of mass timber, the concern around combustible structures are not solely related to the potential for the structure to burn, fail and collapse. Where buildings are constructed using traditional masonry materials, the size of a fire is likely to be determined by the contents of a compartment (e.g., fixtures, fittings, belongings). In mass timber building, particularly where there may be a drive towards having the elements of construction

unencapsulated (e.g., exposed CLT walls and floors), in addition to the contents, the compartment itself has the potential to burn and directly contribute in the development of larger, more serious fires.

There are also concerns related to what happens after the fire is extinguished. Whilst the fire may be out on the surface, the timber can continue to burn and smolder underneath the surface. It is necessary to understand the different fire dynamics associated with mass timber fires to determine what the likely outcome of a fire will be and whether supporting fire safety provisions are sufficient to maintain the overall standard of safety.

When considering mass timber and modular construction, in order to safeguard both building occupants and responding firefighters, there needs to be much greater understanding of how buildings constructed this way will perform in the event of a fire, which includes understanding how they will fail. We believe this can only be achieved through research and testing.

Whilst we understand that some modular manufacturers are undertaking significant amounts of fire testing to demonstrate the safety of their products, this is not considered independent testing. We would welcome the development of specific large-scale testing protocols to underpin the use of these innovative construction techniques and materials.

Lack of MMC fire data is a barrier to gaining greater understanding, and confidence of the risk of fire in MMC buildings. Where fires in such buildings have occurred and developed or spread in a manner that would not be expected, they should be investigated to understand the reasoning for this. We should be taking the opportunity to learn from all incidents and not just waiting for a major incident.

Given the lack of long-term data, it is also imperative that we keep an up-to-date record of buildings constructed using MMC. We have seen in the past where new, innovative systems of construction have been used (e.g. LPS and RAAC – where safety concerns are subsequently identified and need addressing) although identifying the buildings is a great challenge.

However, the need to understand where MMC buildings are located is not just about the potential for remediation in the future but about the need to support firefighters now. Current operational procedures for safe and effective firefighting are based on an understanding of how a building is expected to perform in the event of a fire. This understanding has been developed over many years based on research, testing and real-life experiences of fires in buildings constructed using traditional methods. In the case of MMC, there is no such body of evidence and NFCC are concerned that fires in such buildings are exposing firefighters to higher levels of risk.

This problem is exasperated by the fact that in many cases, once completed, MMC buildings are indistinguishable from those constructed using more traditional methods. Whilst fire and rescue services are consulted during construction of a new building as part of the building regulations process, they are often not informed of the construction methods used. This information may only come to light during an incident where a fire begins to develop in an unusual or unexpected manner, at which point the opportunity for effective intervention may be lost.

The concerns around MMC will take some time to properly address, however NFCC are concerned with potentially having a building environment legacy with gaps that could be exposed by an intense fire event due to failure to capture the MMC used in construction today.