BUILD HOMES, **BUILD** JOBS, **BUILD** INNOVATION: A BLUEPRINT FOR A HOUSING LED INDUSTRIAL STRATEGY

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September 2020

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HTA have a substantial track record in volumetric modular and MMC (Modern Methods of Construction) delivery of award-winning homes.

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“THE WAY IN WHICH WE BUILD HOMES HAS NOT CHANGED FUNDAMENTALLY FOR THE LAST FIFTY YEARS.”

“The way in which we build homes has not changed fundamentally for the last fifty years. There has been a great deal of talk of seizing the opportunity presented by new technologies, but it has yet to really capture the public imagination. The post-Covid-19 world provides a genuine chance to turn the page and embrace Modern Methods of Construction to deliver the step-change required. Seizing this opportunity would support advanced manufacturing, create highly skilled jobs and help improve productivity in construction. But that is only part of the story: it would also provide new affordable homes for families in the sorts of numbers we need as a country. It would provide those homes faster, with fewer carbon emissions and at a higher quality than traditional methods. We have a real chance now to make this vision a reality.”

Mayor Tim Bowles, West of England Combined Authority

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FOREWORD: CAN MODULAR HOMES BE BEAUTIFUL?

Nicholas Boys Smith



How should we build? Quality or quantity? Craft or mass-production? The soothing pleasures of tradition or the shock of the new? Most simple juxtapositions are misleading but none more so than the canard that beautiful places can only be created through artistic anguish. Modular building can be, and sometimes has been, misused to create bland, clumsy and placeless buildings. There is modular ugliness as well as modular beauty.

However, employed as a way of following a thoughtful and popular design code at reduced cost and with some variety, modular building need not be different from the practice followed in Edinburgh New Town and Notting Hill Gate. To those who criticise the result as 'pastiche' the response is surely yes, in just the way that Georgian London is a pastiche.

Mass production of lovely places is not new. The Romans had standard column sizes. Eleanor Coade pioneered the factory-made production of artificial stone in the eighteenth century. Victorian homes use standard window sizes. And the Americans have been building attractive prefabricated timber houses for years.

As this important report from two highly experienced practitioners sets out, 2020 could be a moment of change.

The English planning system may finally be on track to become less regressive. Ambitious in its morals but anarchic in its mores, English planning speaks of progress but is regressive in practice. Its high risk, high up-front cost, discretionary model has created an oligopoly. We have the most concentrated development sector with the smallest proportion of SMEs or self-build. Modern Methods of Construction, whose high up-front investment is impeded by high planning risk, have struggled to gain a foothold. The digitisation, pattern book and design code agendas set out in the government's important white paper, Planning For The Future, could, if done wisely, alter these fundamentals.

Homes with mass customisable pattern books aligned to local design codes could accelerate delivery, restore competition and increase certainty for neighbours and builders. This would be historic and it would be a good thing.

Nicholas Boys Smith is the director of Create Streets and was co-chair of the Building Better Building Beautiful Commission

September 2020

1.0 INTRODUCTION & EXECUTIVE SUMMARY

We stand at a critical juncture in our nation's history. The global Covid-19 pandemic has had a structural impact on our society and economy in a way we could not have imagined even a few months ago. What the UK now faces is the critical task of rebuilding confidence across a range of areas including public health, job security, consumer spending and of course, the housing market.

There is no doubt that we are in a period of massive disruption for housing delivery, with potential of significant lasting impact. There is a previously stated Government objective to deliver 300,000 homes a year by 2025 to meet the country's needs. Moreover, there is a renewed interest in housing keyworkers such as NHS staff, as well as the post-election 'levelling up' commitment.

The Prime Minister has said his Government will 'Build, Build, Build', putting investment at the heart of the post-pandemic recovery, with housing clearly on the agenda. Returning to business as usual may take many years and one way we can look to mitigate this is by combining lessons from the past with current experience and proven delivery approaches, applying these with focus. The pandemic has also awakened greater awareness in the benefits of more collaborative working, born out of necessity. We look to build on this momentum in this paper.

As practitioners, we have benefited from operating with long term relationships in sectors which have ebbed and flowed through the three most recent recessions, giving us some insight into how the government and housing market might react to the predicted slowdown that will follow the current pandemic.

The urgency for creating a multiplier effect in the post pandemic economy is unprecedented. Any measures need to flow both into the construction supply chain and, in turn, the wider market in a way that supports economic recovery as well as the UK target to achieve a net zero carbon economy by 2050.

In a market which is now expecting an eventual downward house price correction, combined with fears over unemployment, incentives to buy through mainstream purchase discount schemes, banking sector interventions and, indeed, wider fiscal policy now face major real world barriers to success: the propensity or ability to commit to a mortgage is likely to fall to a low point, irrespective of easier availability and affordability.

What is needed is a package of measures that retains at its core the aspiration for ownership but provides a greater choice and availability of stock being delivered, in line with what will ultimately be a recovering transactions market. That means we need to get on and build the homes our country wants and needs now, but we must have a much more versatile and flexible way of transitioning people through tenure in line with what is going to be a gradual and complicated road to economic recovery in the years ahead.

We are seeking to create a platform for significant additional housing delivery and market diversification that also places modern methods of construction (MMC) and, particularly, modular manufactured housing at the heart of making quality homes. In doing so we envisage a major industrial strategy boost that moves us towards a greener future with resulting jobs and opportunities.

The three linked objectives proposed in this paper are:

- **More Homes – a programme to build 75,000 additional, high-quality, manufactured homes a year by 2030.**
- **More Jobs – the potential for 50,000 high productivity and quality jobs, ranging from SME level to larger innovators, all helping to level up regional economies.**
- **More Innovation – beautiful new homes and skilled jobs that are underpinned by fresh design and manufacturing thinking, low and zero carbon performance, cutting edge embedded technology & connectivity and much more innovative thinking in tenure products to maximise and stabilise end market demand.**

This paper is not intended to replace other recovery propositions; it seeks to point to an additional, ambitious direction for Government focus. We have deliberately brought together consultees who represent an unprecedented and broad cross sector network. Leading residential investors, developers, modular manufacturers as well as local and regional government representatives with different political leadership, all with a shared interest in increasing housing delivery through factory production.

We have combined a huge range of thinking and practical experience, often highly developed, with the potential to use the pandemic as a catalyst to supercharge delivery of beautiful, sustainable homes. In doing so we hope to help the Government and its agencies bring a co-ordinated response to its 'Build, Build, Build' commitment.

We also believe the recently launched *Planning For The Future* white paper represents a great opportunity to use a more digitised and progressive planning system to enable a whole new generation of digitally designed and manufactured high quality homes. These homes can have mass customisable pattern books to align to local design codes and create maximum speed of delivery with minimum community disruption.

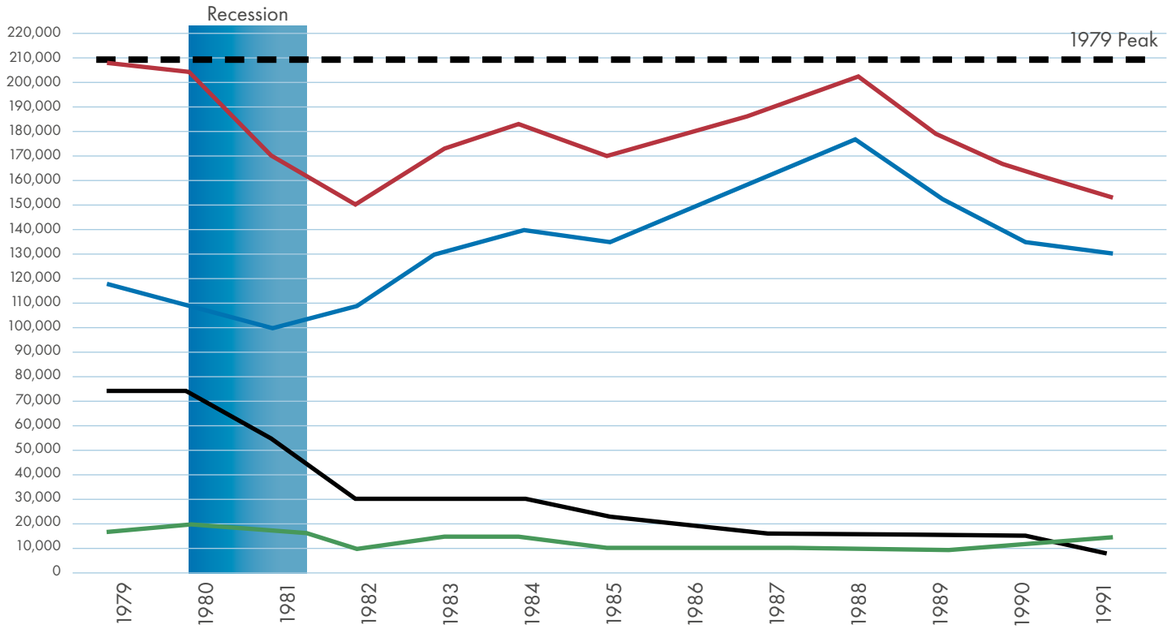
This consultee group is not meant to be exhaustive. To deliver our objectives we will need many more similar organisations committed to creating a lasting positive impact from this historic period, one that transcends political and economic cycles and, importantly can collaborate and work with Government to deliver.

Our ask of government is simple: help us stimulate and then galvanise the demand for modular homebuilding. With this help, a sustained long-term pipeline can underpin investment in manufacturing to deliver the quality homes we need, creating the jobs we want.

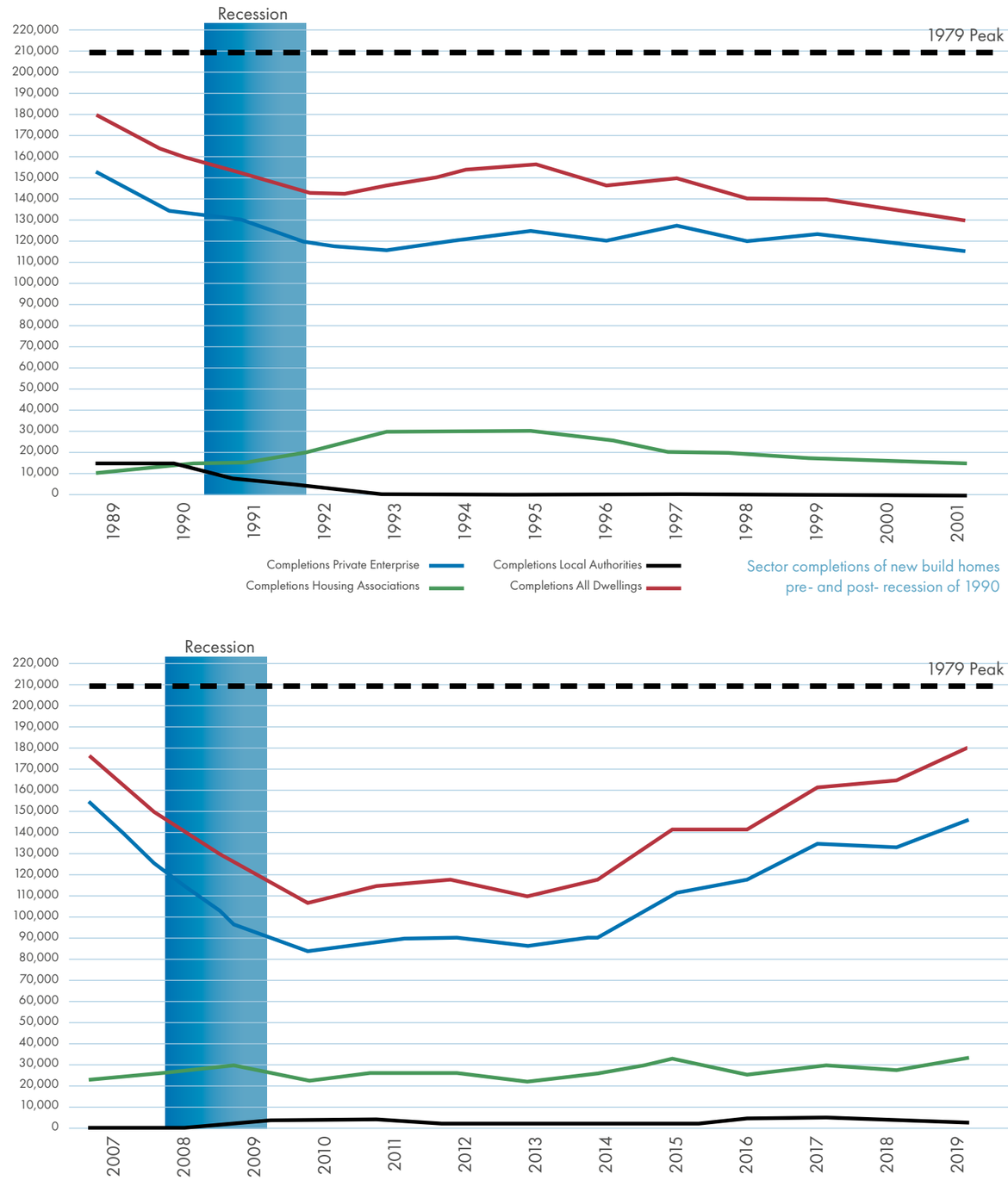
2.0 SETTING THE SCENE: WHY MODULAR & WHY HASN'T IT HAPPENED ALREADY?

2.1 Learning from the past

The importance of the housing market to UK PLC is well understood. However, three recessions in 40 years and subsequent structural changes in how homes are produced has left the sector unable to meet increasing demand. To remind ourselves of past experience, the chart below maps some basic statistics from the previous three recessions [DCLG/ MHCLG LiveTable 244]. Highlighted are the recession years and the recovery profile for housing completions for each sectors output of newbuild homes.



Sector completions of new build homes pre- and post- recession of 1980



Sector completions of new build homes pre- and post- recession of 2008



Canalside living at Greenford Quay Phase 1, Ealing. Developer: Greystar. Main Contractor: Tide Construction. Architects: HTA Design LLP

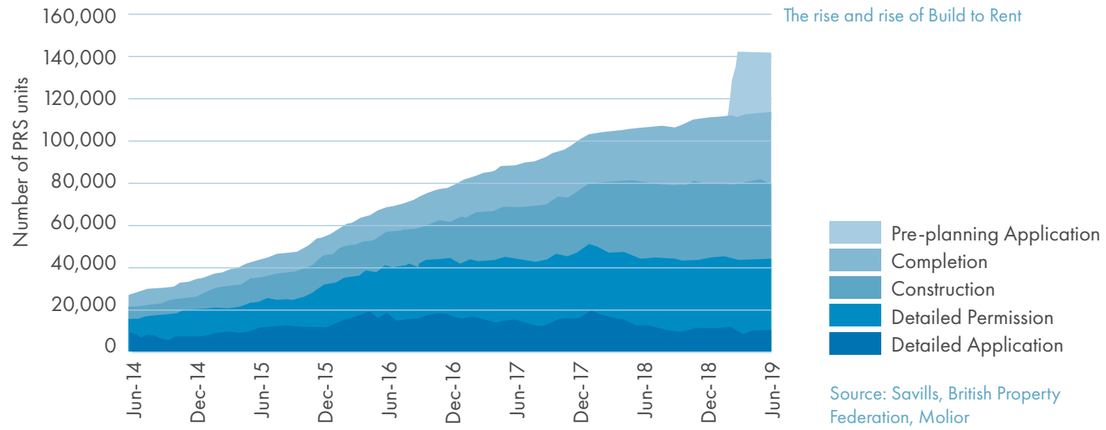
The statistics tell the story of the devastating impact of market cycles on new-build housing delivery. In 1979 the balance of delivery of 209,460 homes was: 57% private enterprise and 35% local authority, with eight per cent by housing associations. By 1989 we relied on the private sector for 86% of the 179,360 homes that marked peak output pre-1990 recession. By 2007 local authorities were delivering just 0.0014% of new homes, while housing associations' share grew to 12% of completions. The fragility of this arrangement was highlighted by the 'Great Recession' of 2008/2009, which swept away a third of SME housebuilders. With further consolidation since, just 10 housebuilders were responsible for 47% of new homes built in the country last year. Meanwhile, housing associations maintained slow, if steady, growth in share throughout the 40-year period, delivering 18% of homes completed in 2019.

With just 178,800 new homes built in 2019 (DCLG/MHCLG Livetable 244) it is clear that we lack the capacity and models to deliver the homes we need, even before we factor in the economic impact of Covid-19.

These most recent figures mask new entrants, each building quickly since the last recession: Resurgent local authorities are building once again, as highlighted in 'Local Authority Direct Delivery' research by Morphet/Clifford – [UCL/RTPI June 2019]. This report drew on responses from 142 different councils, 40% of England's 353 authorities, of which 69% were directly engaged in housing delivery, with 8,992 homes built by 83 councils.

Meanwhile, investor backed 'build to rent' developers have quickly established themselves, delivering high quality homes at scale. Savills research, illustrated below, suggests that over 20,000 homes are under construction. Greystar, for example, set up its development team in 2015 and, by late summer 2020, will have 1,252 homes delivered and a pipeline of over 2,000 more.

Private housing associations have also emerged over the last five years. Savills research noted 50 'for profit' housing associations registered by December 2019, with 5,000 properties under management. And institutional investors are emerging: in 2019, Legal and General announced an intention to buy and build 3,000 homes a year within four years. Meanwhile niche, 'for sale' developers, operating a discounted market model, have gathered strength.



Source: Savills, British Property Federation, Molior

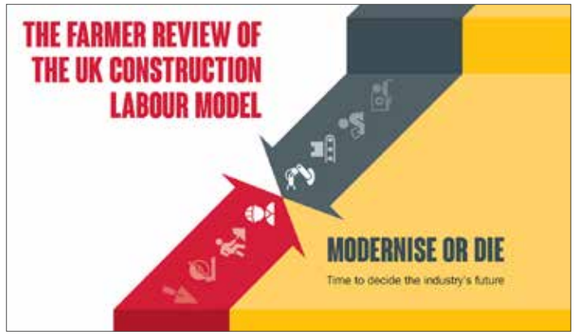
These are new public and private sector players in the market since the last recession. They provide foundations for increasing residential delivery. They share business models based on income yield or discounted sale that has resilience to market cycles.

2.2 The Farmer Review [2016] & Developments Since

The *Farmer Review* drew together strands from a long line of reports looking at construction and housing delivery, dating back to Latham [1994], Egan [1998], Barker [2004], Calcutt [2007] and Lyons [2014]. Farmer issued a clarion call to the construction industry to 'Modernise or Die' in response to a construction skills crisis plunge 25% by 2026. That figure is likely to be compounded by reduced access to European labour and, of course, now a Covid-19 induced downturn. As well as construction industry reform, the report made two key recommendations regarding housing policy that are directly relevant to this paper:

'Recommendation 8: Government should act to provide an 'initiation' stimulus to innovation in the housing sector by promoting the use of pre-manufactured solutions through policy measures. This should be prioritised either through the conditional incentivisation of institutional development and investment in the private rented sector; the promotion of more pre-manufactured social housebuilding through Registered Providers; direct commissioning of pre-manufactured housing; or a combination of any of the above. It should also consider planning breaks for pre-manufactured approaches.

Recommendation 9: Government, as part of its housing policy planning, should work with industry to assemble and publish a comprehensive pipeline of demand in the new-build housing sector. This should be along the same lines as the National Infrastructure Pipeline, seeking to bring private developers and investors into this as far as possible to assist with longer term innovation and skills investment planning.'



The Farmer Review was recognised and referenced in the 2017 Housing White Paper *'Fixing our Broken Housing Market'* and the 2018 Construction Sector Deal. It has raised awareness of the structural decline of the construction industry and has acted as a catalyst for the increased recent discussion about and adoption of MMC. There is however much more to do and the need to overcome various points of market failure undoubtedly require a demand side 'pump prime' intervention in the housing market if we are to see acceleration and the 'mainstreaming' of modular delivery. The means of implementation largely links to the two specific recommendations above.

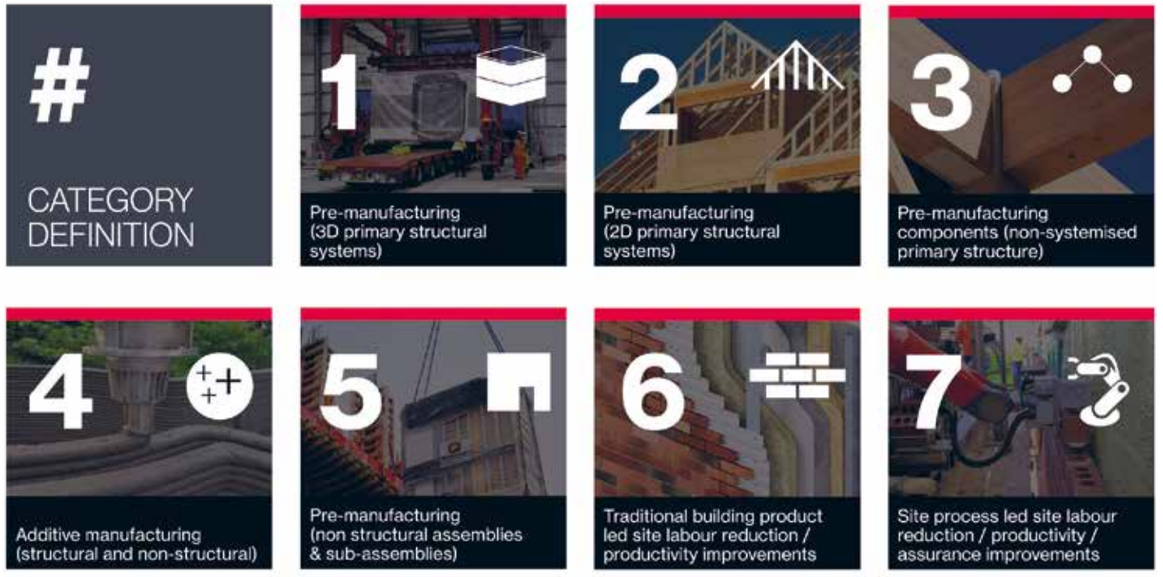
2.3 The recent context for modular residential delivery

We support the use of all 7 categories of modern methods of construction (MMC) as formally defined by MHCLG (March 2019). However, to give this report focus we are channelling much of our attention into the Category 1, volumetric segment. This is deliberate in that it is the single MMC approach most aligned to creating true additionality of capacity in the market and it also has the highest level of pre-manufactured value that can be re-distributed within the economy to achieve wider economic policy objectives including new supply chain creation and 'levelling up'. New modular manufacturers are increasingly creating 'turnkey' solutions that do not rely on existing homebuilders or construction companies who are therefore left to build traditionally or using a hybrid of other part traditional/part MMC solutions as an improvement on current delivery. The market needs all these approaches to deliver at the required levels of increased output.

The current volumetric modular industry has been developing steadily over the last decade with high, medium and low-rise housing projects delivered throughout the country.

We also see a new trend developing for composite category MMC which might include panelised fabric and volumetrically pre-assembled internal spaces such as kitchens and bathrooms. When these are wrapped in a specialist turnkey delivery proposition these have the potential to create a more flexible alternative to full volumetric whilst also delivering the additionality of capacity that we feel is so important. We therefore also actively support this thinking which is starting to appear in the market as part of a multiple component & sub-assembly systemisation of build that is owned by a new breed of construction integrators.

Volumetric or Category 1 MMC modular means the construction of fully finished modules, or structural boxes, that include fitted kitchens and bathrooms. These are bought to site and assembled either with or without external fabric materials. As the Farmer Review notes, this method enables 70%+ of the home's construction value to be manufactured, This is also termed its Pre-Manufactured Value [PMV] and compares to traditional build's PMV of circa 40%.





Selby, North Yorkshire

Legal & General Modular Homes are delivering a full development proposition for 154 homes carbon-friendly houses and apartments in North Yorkshire. They have also recently agreed a scheme for 188 homes at Bonnington Walk, Bristol. This development will consist of 51% affordable homes with a mixture of both council housing and shared ownership.

Developer and modular contractor/ manufacturer, Legal and General Modular Homes.



Bonnington Walk, Bristol

Manufacturers including Berkeley Modular, Ilke, Legal & General Modular Homes (L&GMH), Swan Nu Living, TopHat, and Urban Splash have each recently invested in factories, products and system development with ambition to deliver thousands of homes a year. These companies are focused on low rise modular homes, predominately houses, with potential to deliver apartments in medium rise blocks.

Meanwhile, medium to high rise volumetric modular delivery has been honed by fewer specialist manufacturers, such as Caledonian, Elements and Vision Modular Systems. It is worth noting that Berkeley Modular's new system will be capable of delivering from 2 to 20 storeys providing an unprecedented level of versatility enabled by one of the most advanced digital manufacturing platforms in the world. Vision Modular is already a global leader in high rise modular, building several significant projects through its development company Tide Construction – most notably 546 homes in a 44 and 38-storey development in Croydon, south London. This currently is the tallest modular residential scheme in the world, and it was delivered in just 31 months.



George Street, Croydon

On the demand side, there are increasing signs that modular manufacture is being embraced. Birmingham Municipal Housing Trust is rolling out a programme of homes on infill sites and the West Midlands Combined Authority is mandating minimum levels of modular home delivery on certain of its sites as part of a broader Local Industrial Strategy. Meanwhile, Barking and Dagenham's housing arm, Be-First, is developing a 300-home, low rise modular project. Other local authorities throughout the UK are undertaking similar schemes, exploring modular delivery.

It is the private sector, led by build to rent developers Greystar, and discounted sale specialist Pocket Living , that have pushed the boundaries of scale and quality in manufactured residential development procured for their projects.



TopHat, Chatham



Beechwood West, Basildon, Essex

Using their own modular factory , Swan/ NU Living are regenerating the 1960's Crayland Estate with 251 new homes that residents can customise using innovative digital software.

Developer and modular contractor/ manufacturer - Swan NU/Living. Architect - PTE



"Greystar has several build to rent and student projects designed by HTA and delivered by Tide Construction / Vision Modular Systems, including the 546 home development in Croydon and the first phase of a 2,500 home development in Greenford. Both projects were delivered in half the time of traditional construction. "

Mark Allnutt - Senior Managing Director

Before the pandemic hit, the country was tasked by Government to increase productivity and performance. The UK Industrial strategy (*Building a Britain Fit For The Future* published in December 2017), which sets out the UK Government's ambitions to boost productivity and earning power, aimed at a technology-led strategy and greater collaboration.

This echoes the earlier *'Construction 2025'* paper [published July 2013] which had already challenged the sector to the following targets;

- 50% faster delivery
- 33% reduced costs
- 50% reduced carbon

Greenford Quay, Ealing, London

Greystar purchased a long vacant site in 2015 and are developing a 2500 home new residential quarter. The first phase of 379 modular homes was delivered in 20 months and a second phase is now underway.

Developer – Greystar, Modular contractor/manufacturer Tide/Vision modular Systems. Architect - HTA Design LLP





With over 6,000 volumetric modular dwellings delivered, Tide Construction and their manufacturing company, Vision Modular Systems, have shown that a 50% increase in speed of delivery is attainable, with higher quality and fewer defects than traditionally delivered housing. Moreover, the public sector purchasing framework LHC says that, when measuring whole life costs, MMC delivers a 10% saving over 30 years compared to traditional construction, without factoring in the benefit of scale. Magna Housing who used the South West Procurement Alliance to procure their modular partner, Rollalong, have carried out a detailed whole life cost analysis which has shown, on a discounted cash flow, basis that their modular solution has better whole life performance over a 30 year term than a traditional build equivalent, paying back initial investment up to 5 years earlier.

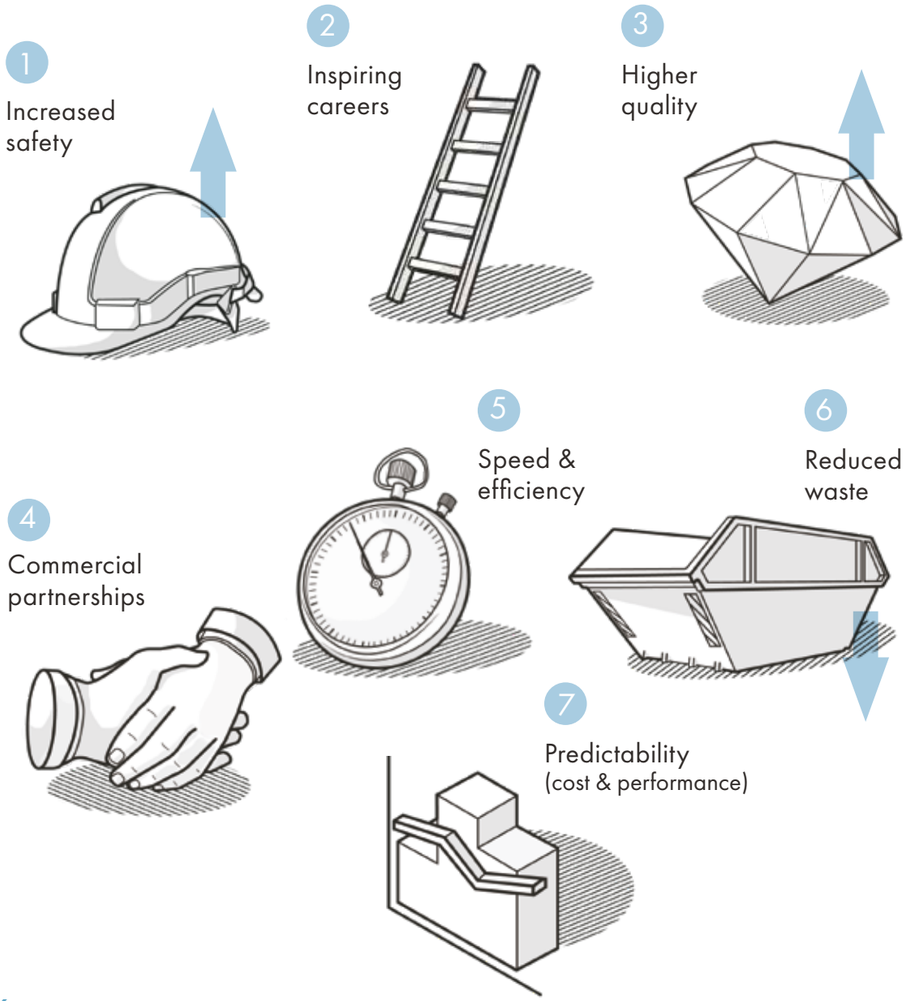


The benefit of modular delivery regarding speedy outcomes is well understood. While this is undoubtedly the most visible attribute, there are many other benefits compared to traditional construction.

With up to 60% fewer operatives on site there is significantly increased site safety and less disruption to surrounding residents with less materials and construction traffic. A highly trained site assembly workforce importantly marries with skilled factory based employment. Higher productivity and efficiency means up to 80% less waste than with traditional construction and as much as 97% of any waste recycled. Factory based manufacture also increases control, with resulting greater predictably regarding quality, cost and delivery.

Understanding the wider Benefits

Traditional vs offsite design



Modular-delivered homes also offer a dramatic improvement in embodied CO_2 compared with traditional construction. Heriot Watt University research says that just one building at Greenford Green saved the equivalent CO_2 to planting 160,000 trees.

"Zero carbon homes should be built as standard in England within the next five years as we learn again how our built and natural environments can work in harmony."

Robert Jenrick - Secretary of State for Housing Communities and Local Government

Embodied CO_2

Research demonstrates that offsite technology can cause nearly 40% fewer emissions than traditional construction. This equates to....

26,000 tonnes of CO_2 =

3,562
Zero-energy homes being run for an entire 12 months

7,030
Vehicles taken off the road for a whole year

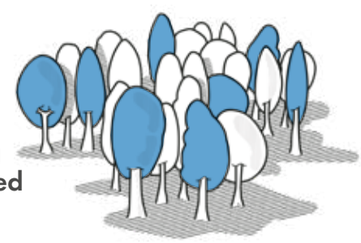




810,000,000
Balloons of CO_2 gas being removed from the atmosphere

Source: Heriot Watt University

160,287 Trees being planted





Chapter White City, London

This project developed by Tide/Vision in a sensitive conservation area combined system flexibility with beautiful attention to detail to create a new high quality landmark in the area. Developer and modular contractor/manufacturer - Tide/Vision Modular Systems for Chapter (Greystar). Architect – HTA Design LLP



Modular manufactured homes can meet and exceed current ambitions for Zero Carbon in housing development and accelerate beyond the proposed Future Homes Standard set out in recent consultation. This can be important to the country's plans to achieve its now legally committed target of net zero carbon by 2050.

However, modular manufacturers' require certainty – effectively, the booking of production slots in factories – which also means that planning consented projects proceed at pace once permission is granted. In contrast, homeless charity Shelter recently pointed out that 280,000 homes were given planning approval between 2011 and 2016 and never built.

One key difficulty raised by manufacturers is a lack of certainty over planning timescales. While a traditional contractor can hold off mobilising and committing resources if a project stalls in the planning process, that is not an option for a manufacturer with potentially hundreds of people in a factory on a production line.

As the Government turns its attention to "Building Better" there are also demonstrable benefits from a workforce operating in modern factory conditions, often in areas where employment opportunities are limited. As well as the recognised benefits of speed, quality, certainty and sustainability, modular manufacture also offers a pathway to safer working post pandemic, where social distancing could remain a longer term and possibly recurring constraint on production and construction operations.

2.4 The Need to Overcome Market Failure

We have come a long way in the past decade, with manufacturing able to deliver beautiful homes at scale, so why hasn't the sector taken off more widely?

There are 10 key points of 'market failure' that go to the root of why modular housing delivery has not matured in the UK and indeed in many other countries. Many of these issues are discussed in this paper.

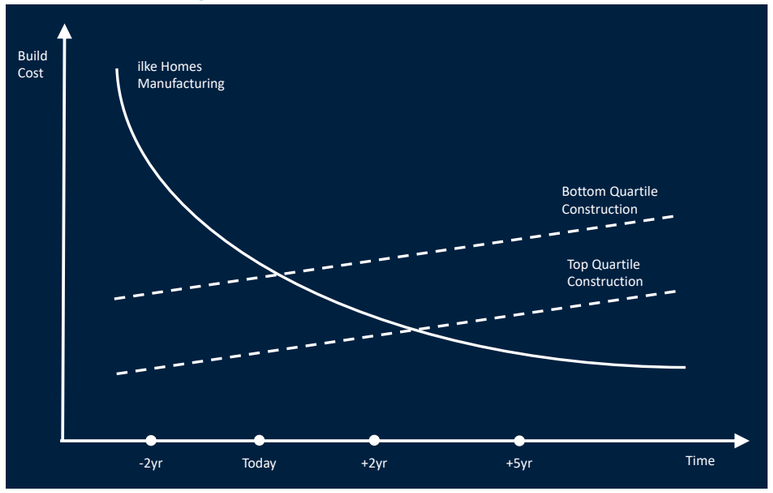
10 critical points of market failure (Cast Consultancy)



Modular delivery in the residential sector has had to confront very fragmented demand: virtually every client organisation has developed a bespoke design and procurement approach which mitigates against sustained delivery through factory processes and increases cost.

The adjacent chart illustrates the demand sensitivity on unit production costs, reducing over time in line with greater volumes. This reflects the basic principles of economies of scale which the industry needs to be able to compete and ultimately out perform against more traditional models of delivery.

Build cost inflection point - Ilke Homes



"A steady predictable growing volume is ideal as this enables a manufacturer to grow efficiently which leads to better quality, improved productivity, improved efficiency & lower costs. The converse i.e. volume that grows & reduces as different projects start & finish is more difficult for a manufacturer to manage than a traditional site-based builder as they employ the bulk of their workforce on a contract by contract basis rather than permanently employ them."

Rosie Toogood – CEO, Legal and General Modular Homes

The most successful manufacturers have investor backing and often have access to deep pockets, able to fund three to five years of capital investment in production systems before bringing them to market. New entrants are sometimes thinly capitalised, without the covenant most organisations need to be able to engage in delivery, creating perceptions of risk of business failure which can deter potential clients. Those manufacturers, of all sizes, who have succeeded in building mature businesses have gone on the hard journey by demonstrating their competence with real schemes and can point to their track record. Others who have had technical development problems or indeed have never been able to build sufficient demand have failed or remained fragile. This is a natural evolution of the market but if we are to responsibly diversify capacity, this process needs speeding up with the right safeguards in place.

Part of the structural failure of the MMC market to mature has been that the cashflow, early decision making, and early design freeze required for modular manufacture do not fit well with the housebuilder "Return on Capital" model. It is housebuilders who dominate housing delivery and are, in turn, well engaged and resourced to access land, including public and privately owned sites.

However, there is a good fit with yield based or specialist market business models, demonstrated by the take-up of modular delivery in the hotel, student housing, build to rent and affordable housing sectors and among niche, discounted sale developers. To them, modular manufacture offers certainty of cost and quality but also a faster completion, and more immediate rental and income flows supported by end demand.

This paper aims to tap into this natural business synergy to drive housing delivery.

Modular homes are manufactured in an operating environment largely designed for traditional construction: regulations and planning as well as government grants and views of funders and insurers are aligned with craft-based, on site building rather than factory production. Because the market is fragmented, modular is more expensive than traditional construction in terms of initial capital outlay. Investment in factories and a standing workforce are costs that traditional contractors do not bear.

Everything from training and education, practice and process adopted by clients, their professional teams, procurement and frameworks, planning and building regulations, and warranties and funding will need to align with a 'modular mindset' so that the advantages can be fully realised.

Meanwhile the post war housing growth era led to systemic failures in mass construction. This legacy often informs professional and public opinion. To counter this, manufacturers work hard to tackle, head-on, perceptions of quality that linger from a "prefab past". The sector must therefore set a high bar for quality, following the best in class, and expect a higher level of scrutiny than other delivery methods.

The ultimate ambition is once the market has been re-shaped and re-educated there is a lot less focus on the method and attention turns to the end outcome which will always be the critical measure of success.

Recently a major step forward was achieved in terms of building confidence in the financing and insurance of MMC. A collaborative Memorandum of Understanding has been agreed amongst the leading new build warranty providers to work towards aligning technical assessment methods used for MMC. Greater uniformity is vital if we are going to avoid confusion over required minimum standards. In addition the MMC assurance market has been expanded with the recent introduction of the NHBC Accepts standard that manufacturers can now secure. This builds on the pioneering development of the Buildoffsite Property Assurance Scheme (BOPAS). Both of these standards provide a scalable basis for the mainstreaming of modular and MMC delivery with the finance and insurance communities.

Ultimately modular manufacturing and MMC systems must enable high quality residential design. For the homeowner, the fact that a house is modular is secondary to the fact that it's beautiful and practical and affordable.



The Hundred House

Ilke and HTA Design collaborated on a winning submission for a Sunday Times competition 'readers choice' Award to design a 'Terrace of the future'. The principles of creating popular contemporary modular homes has led to a long term relationship developing this approach to future sites.



3.0 ‘DEMAND LED TRANSFORMATION’ THE PATHWAY TO MORE HOMES, MORE JOBS AND MORE INNOVATION

Building a pipeline

Now is the time to grow and diversify the structural base of housing delivery in the UK.

We have engaged with an extensive list of consultees, many of whom are already exploring or active in the modular delivery of homes or other forms of MMC. We are seeking to galvanise and grow this movement by calling on Government and its agencies to support a coordinated scaling up of delivery. This is the single most important part of our recommendations and is the critical dependency to being able to overcome the identified market failures discussed in Section 2.0 of this paper and unleash the potential of this new way of delivering homes.

3.1 The demand side

Each of the sectors listed below operate at least in part on long term investment and yield based income models and have a role in providing land and guaranteeing demand for development, absorbing homes as they are completed. These sectors are all active beyond the core housing for sale market and are an important part of building the greater demand resiliency that modular delivery requires.

Combined Authorities, Unitary Authorities and Local Enterprise Partnerships - 50% of England’s population lives within a combined authority. With a white paper anticipated this year and greater devolved decision making in the regions for housing, skills, energy and technology, embracing modular delivery as part of local industrial strategies will drive key outcomes. Many are already doing so.

Local Authorities - municipal housebuilding is a major growth area. As a developer and owner of homes councils directly deliver for local people. There is great scope to increase outputs by bringing collaboration and shared purpose to local authorities that already develop.

Housing Associations – with over 40 years of experience directly delivering social rent, affordable, market rent and for sale homes, some have invested directly and have vertically integrated factory capability or have commissioned in modular trial projects, extensive research into design for manufacture approaches and have a good understanding of how to improve delivery in difficult markets.

Build to rent and niche discounted market sale developers - We have already noted that private sector





George St, Croydon, London

The accolade of the worlds tallest residential modular tower is secondary to the quality of this milestone building. 546 homes in two towers reaching 44 storeys demonstrate the technical excellence achievable in modular delivery. A constrained site in a busy location 1500 modules were assembled in just 31 months. A new landmark for London and more homes for its residents.
Developer and modular contractor/ manufacturer - Tide/Vision Modular Systems for Greystar. Architect – HTA Design LLP


Heartlands custom build, Cornwall. Developer: Igloo, Architect: HTA Design LLP

organisations operating faster absorption based models have been quick to adopt modular delivery at scale including Build To Rent Developers and Discounted Market Sale specialists. With regard to the latter, this suggests an interesting potential alignment could be made to the proposed *First Homes* initiative provided it was decoupled from speed of open market sale delivery by conventional developers.

Self-Build & Custom Build Market – unlike in Europe where a thriving custom and self-build market has developed; the UK new build model is dominated by speculative development. The ability to link more consumer choice in design optionality and connecting that in turn with manufacturing and more SME delivery is one that has significant potential in the UK, especially when combined with intelligent planning reform as suggested by the digitisation, pattern book and design code agendas included within the *Planning For The Future* white paper.

For Profit Housing Associations - investor-backed for-profit housing associations are seeking scale which has so far eluded them. It is quite likely that the pandemic will leave housebuilders with significant surplus stock, once stamp duty relief stimulus ceases in March 2021, giving an opportunity for absorption and the creation of a platform for ongoing development in the for-profit sector. Combining their interest in yield with modular would create further opportunities for increasing demand.

For the above sectors to be able to support more programmatic modular delivery, they all require a positive policy environment that supports their business models and in cases where they receive public money or land, there is also a clear opportunity to mandate or incentivise modular delivery, even if it is short term 'pump prime' intervention to get the modular market to a self-sustaining point of maturity.

"Building affordable and social housing is one of the biggest challenges we face across the country. As a city we are committed to exploring innovative ways of building better value, high quality, sustainable homes. Nationally, Bristol is increasingly seen as leading in the use of MMC housing solutions; combining the opportunity to increase social value and productivity whilst lowering carbon to meet the needs of the city's housing demands. Our commitment to building more homes and supporting healthy and resilient community sits as one of the key themes of our 'One City Plan' - as lessons are learnt the ambition is to share those with other local authorities and support greater regional, national and international collaboration."

Marvin Rees – Mayor of Bristol

3.2 The Supply side

Just as the demand for modular-based homes is fragmented, the UK modular manufacturing sector is not homogeneous. It includes companies that have invested in cutting edge technology, and systems with significant flexibility, able to build to great height; others focused on low rise, often still very manual, craft-based approaches using standard housetypes. Each approach exhibits unique attributes and business drivers.

Some manufacturers have evolved construction and development skills and some developers ,conversely, have developed models where they are vertically integrated and manufacture their own homes. Both approaches are successful in offsetting market derived pipeline and procurement uncertainty: Berkeley Modular, Ilke Homes, L&GMH, Swan Nu Build, Tide/Vision, Top Hat and Urban Splash all have, at least partially, vertically integrated models. They are overcoming recurring procurement and market fragmentation problems by becoming both the developer and manufacturer within a single entity.

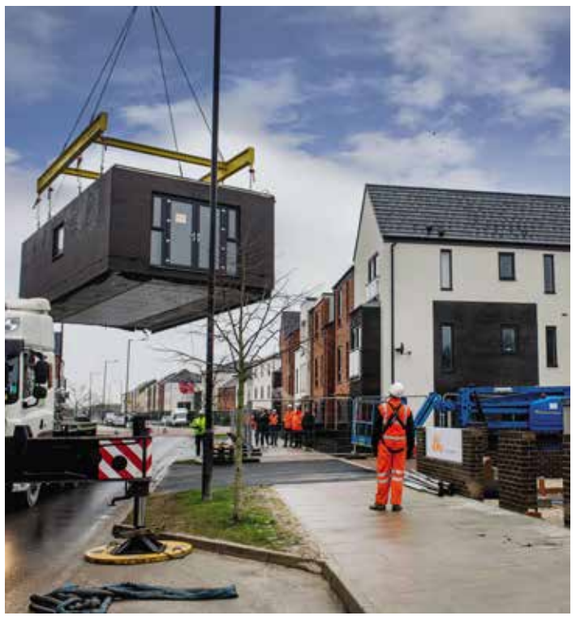

Beechwood West, Basildon. Developer and modular manufacturer: Swan Nu Living. Architects: Pollard Thomas Edwards


Legal & General Modular Homes Factory Sherburn in Elmet, Leeds

"In Scandinavia, where offsite construction is the norm, the contractors all have their own integrated supply chain for modules or panels. In the UK the big issue is the interface between MMC supplier and contractor and fact that contractors model means they often can build cheaper and even faster conventionally than using MMC. This problem has to be cracked to really change things unless MMC producers can start to deliver the total build package "

Pat Hayes – Managing Director, Be-First

There is an important distinction, therefore, between manufacturers that just supply volumetric modular products for other constructors to assemble and those that offer "vertically integrated turnkey delivery" as referenced above. This paper, as earlier described, is particularly promoting the latter model as it will deliver true additionality to the housing market rather than just enabling the existing constrained housebuilder and contractor base to do things incrementally better. Although both approaches are needed, this will have the biggest impact on additional new homes and new jobs.



Ilke Homes module installation

We calculate that there is potential capacity at the moment in the volumetric modular sector to deliver 10,000 - 15,000 technically accredited, mortgageable homes in the UK with only 7-8 businesses able to deliver over 1,000 homes per annum as of today. Of that capacity only 30-40% is currently being used so the starting point for any strategy must be to fully utilise existing untapped production capacity including bringing in the untapped technically accredited SME capacity that exists.

This latent existing capacity can act as the foundation for increased shift working and then factory expansion by existing players but also then act as the pathfinder for new players to enter the market at varying degrees of scale dependent on demand trajectory. However, this supply maturity is entirely reliant on increased and more programmatic demand side stimulation as positioned above. An important point to note is that there is much interest in new factory building, especially in relation to local industrial strategies and political pressure to deliver 'on the ground' tangible investment. It would however be wrong to be building further capacity in this market first, without the demand side invention proposed by this paper or indeed before current latent capacity is fully utilised. Such supply side support would be unsustainable without being fully coordinated with demand side action.

What is clear, and as identified as one of the 10 core 'market failures' is that on both the demand and supply sides of the equation, there is a fundamental lack of collaboration and aggregation that perpetuates fragmentation and a lack of ability to achieve scale efficiencies.

We have the potential to build up this emerging sector and create an industry of world leaders in the Design, Manufacture and Assembly of high-quality modular homes. At the heart is the potential, by building on the stakeholder engagement that we have tested in the preparation of this paper, to create a truly pan industry coordination and brokerage platform. With Government leadership, integrating at a national level, both the demand and supply side of the turnkey modular market we can build sustainably on the existing market capacity and capability without over stressing it or indeed encouraging investment ahead of real demand and storing up future financial distress.

3.3 The consumer

Even before Covid-19, consumer demand for homes was massively impacted by limited availability, and therefore lack of affordability of stock. The willingness or ability to commit to a mortgage could now be further limited by job security issues. The pandemic will likely increase the number of people seeking sub-market and market rent products. Meanwhile, recent evidence supports ongoing demand for professionally managed rented housing as we can see from the mid lockdown results from Grainger.

Savills recently published a cautious assessment of the sector, facing increased mortgage hurdles and falling stock markets impacting savings for deposits, with a possible 40% reduction in transactions. Despite initial activity from pent up demand as we emerge from lockdown, it would be reasonable to expect the sales market to contract, as it has during past post recessionary recoveries.

Existing delivery models that dominate the market will not support increased building unless developers' exit risk is addressed, irrespective of what discounting, planning breaks or other incentives are implemented to pump prime activity. Simply put, developers will not build out projects unless there is an end client, whether it be a domestic purchaser, a housing association, a local authority, an institutional investor or fund, or indeed the Government.

What this in essence demands is greater tenure diversity as means of promoting post pandemic accelerated delivery. We need to maximise the physical quantum of new homes and infrastructure delivery so it positively impacts the economy in terms of immediate job creation and multiplied spend. Ultimately, homebuilding at scale will only be viable if it is also fundamentally aligned to market absorption through diversity of tenure and the related financial solutions available.

"Grainger is in a strong position financially and our portfolio is performing as expected, showing a high degree of resilience during these uncertain times. We have achieved high rent collection, strong rental growth and maintained occupancy levels over 97%. We have continued to grow our business, serve our customers and deliver new rental homes."

Helen Gordon, Chief Executive of Grainger



Urban House, Greenwich. Developer: Berkeley Homes

3.4 The opportunity

We estimate the UK Category 1 residential modular output for the last year to be less than 3,500 homes. This has the potential, over a 5-10 year period, to grow to 50,000 additional homes a year through expansion of existing players and new entrants as the Farmer Review suggested. Our proposition is to use the pandemic recovery impetus as a further catalyst to grow the sector to 75,000 additional homes annually by the end of the decade. The ambition is to make modular residential delivery the solid, constant bedrock of annual delivery with market sale volatility taken up in the traditional build sector which has more flexibility through its low fixed overhead sub-contract led trade model.

The *Planning For The Future* white paper creates an opportunity to underpin this level of growth ambition. It's proposals can deliver a digital planning system which can act as the catalyst for a digital pattern book and product customisation journey. This could enable beautiful homes to be delivered using well engineered, flexible modular systems as well as generic pre-manufactured modular chassis approaches. Homes can be potentially dressed in local sourced materials or replicated aesthetically as appropriate to local design codes.

All of this can embrace the delivery capability from SME's to large industrial and can be a national scale piece of innovation that helps unlock a wholesale move to MMC delivery.

Once existing appropriate capacity is fully utilised, we calculate that a further 20 centralised production factories or 'hub and spoke' networked factories, each with capacity to create 2,000 homes a year will be required to enable peak output with a balance of SME led more localised delivery. Our survey of manufacturers demonstrates a willingness to invest in and open new factories based on a secure forward pipeline of work. Meanwhile our research indicates that some combined authorities and local authorities are already looking into promoting new factories to deliver modular homes. It is important to reiterate that this activity must be properly coordinated to avoid inadvertently cannibalising a nascent market and increasing under-utilisation before sufficient demand is stimulated.

We also believe there is a unique opportunity to bring SME trade contractors and suppliers into the modular and MMC market by establishing a new generation of 'consolidation centres'. These centralised, but regionally located, factories could be permanent or temporary and would bring traditional parts of the supply chain together to pre-manufacture and assemble whole homes.

"With the model we have created we could open a factory in a new geography if there was guaranteed volume – we would need at least 500 homes per annum and an availability of cost-effective labour to operate the factory "

Dave Sheridan - Executive Director, Ilke Homes



Swan Nu Living factory

By co-locating a range of part traditional, part manufacturing techniques, in collaboration with other members of the trade supply chain, the barriers to industrialisation for SME's can be addressed. This could be the bridge between the existing and new modes of delivery that best accesses the huge SME tail of our homebuilding industry.

We therefore argue that investment in, and support for, the modular residential delivery sector should be a key plank in the Government's post pandemic industrial strategy. Using homebuilding as a lever for implementing the "levelling up" agenda and challenging the notion that the value added to the economy by construction happens on site, through the use of traditional tradesmen in a final delivery location. As housing demand is at its highest in London and the South East, construction activity has only reinforced what has become an unbalanced economy. The opportunity is to make a much higher proportion of the home's value (it's pre-manufactured value or PMV) elsewhere and distributing much more value in other parts of the UK whilst retaining jobs and opportunities at the point of delivery in terms of necessary enabling and preparatory site work and modular assembly.

With focus, it will be possible to create a significant new employment base in modular housing manufacture once existing capacity has been utilised and existing employment secured, including through multiple shift patterns. From discussions with consultees in the sector, each factory operating at a capacity of 2,000 homes per annum would create on average 600 jobs, or 12,000 new jobs based on the 20 factories envisaged. Based on econometric principles, this is likely to also support a further 15,000 jobs in the related supply chains, including in manufacturing equipment supply. Extrapolating this to a 2030 target of 75,000 modular homes per annum would create and sustain a total of 50,000 additional jobs.

These employment numbers would be further reinforced by employment retention if a 'consolidation centre' approach was taken, as described above, to allowing traditional SME parts of the supply chain to become part of 'virtually integrated' modular delivery solutions being underpinned by new sources of demand, modernising employment practices, securing quality and improving productivity.

To do this we will need to better support the modular manufacturing sector, understand its investment needs and business sensitivities and create a pipeline of demand that fits industry models and processes.



Elements Europe were able to use stone facades with their modular system to deliver this project for Berkeley First in Bath. Architects: Stride Treglown

Housebuilding already delivers a considerable proportion of jobs and value to the economy accounting for 30% of construction activity in 2018, [Construction statistics, Great Britain: 2018 ONS]. Residential activity has previously been calculated to add 1% of value to the GDP for every 100,000 homes delivered.

Oxford Economics



Birmingham Municipal Housing Trust

BMHT are using modular manufacture to deliver on problematic brownfield sites - of which the city has more than 1,000 - which typically ramp up the development cost, do not accommodate affordable housing and often put off private developers.

Developer – BMHT - modular contractor/ manufacturer - ModPod

3.5 Collaboration, Aggregation and Quality

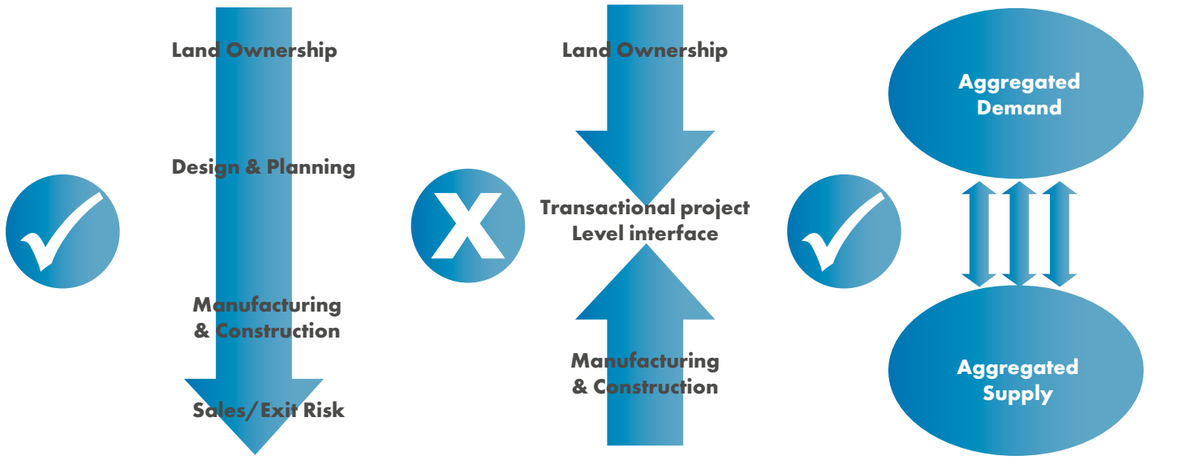
The most important step to underpin demand side stimulation and to achieve the growth in modular manufactured homes and the jobs envisaged is to create a smooth, sustained, long-term pipeline of demand that is visible and appropriate for modular delivery.

The term 'aggregation' is used here to describe the process of bringing those organisations interested in both commissioning modular homes and those delivering them together to pool knowledge, processes, standards, R&D, typologies, land and commitment into a programme of scale that can be aligned to capacity and readily manufactured. Implicit in this is better integration with turnkey manufacturers who in turn need to increasingly collaborate amongst themselves and offer greater supply side aggregation solutions : success will be founded on long term commercial relationships rooted in repeat business and continuous improvement as well as creating a diverse but structured market that is quality led and is focused on 'growing the cake' rather than 'slicing the cake into smaller and smaller pieces'.

The interface between aggregated demand and supply needs to be designed so an effective and efficient brokerage mechanism enables 'call off' contracts, dynamic purchasing and scale led orders to be placed so that the right capacity is aligned to the appropriate demand sources. For fully vertically integrated businesses who are developers and manufacturers, this demand / supply transactional interface is embedded already, but to create simulated vertical integration across the wider market, the central clearing house for combining programmes of activity has to be established, smart and probably will need to be technology enabled.

The move to greater demand and supply side aggregation should build on modular manufacturers' already significant investments in developing a broad variety of systems and product types. This investment must be leveraged, not undermined, in a move towards a gradual alignment, including areas of product or interface standardisation and a new operating environment. We observe that many modular manufacturers are already collaborating amongst themselves and sharing ideas and initiatives ahead of anything more strategic and impactful such as we propose here.

Aligning land & capex commissioning with manufacturing capacity



Vertically Integrated Model

Transactionally fragmented - developer & separate manufacturer

Market acting cohesively, collaboratively and at scale amongst developers and manufacturers



Mapleton Crescent, Wandsworth, London

Pocket Living started using modular delivery in 2016 and this project was their first high rise scheme delivering 89 homes in 22 months on a very constrained urban site. The 27 storey tower once again demonstrates system flexibility enabling award winning design quality.
Developer – Pocket Living, Modular contractor/manufacturer Tide/ Vision modular Systems.
Architect - Metropolitan Workshop

The path to aggregation and successful collaborative relationships

For private sector organisations, commercial considerations will drive attitudes to collaboration and engagement with new initiatives. The route to engagement is unconstrained by public sector procurement protocols: it is about the direct relationship of modular delivery to the bottom line, and fiscal, time and quality objectives. Success is best evidenced where commercial relationships lead to repeat business.

The relationship between, build to rent developer, Greystar and Tide/Vision modular has grown from an initial forward purchase of modular projects to a close collaboration that built the world's tallest residential modular tower and, most recently, a multi-phase 2,500 home development. The attributes of modular combined with Greystar's income-based model, lead to projects of scale and quality, delivered at pace. This is an important real world precedent for proving that collaborative modular delivery makes sound economic sense for a major developer/investor. Why wouldn't this be the case for other parts of the market?

Pocket Living, specialises in well-designed, compact homes for eligible first-time buyers at a discount of 20% to the market. The company has developed standard typologies and used these to construct schemes with different modular manufacturers, including the award-winning Mapleton Crescent project in Wandsworth. A review of new buyers in a recent Pocket scheme suggested that a significant majority of purchasers were key workers, engaged



Greystar, Tide/Vision Modular. Architect HTA Design

directly or indirectly in fighting the Covid-19 crisis. The relevance of this model may well be increased if the proposed *First Homes* proposal can be diversified beyond purely Section 106 delivery by traditional developers and be part of the demand side stimulation we are seeking through alignment to specialist modular led delivery platforms. The same applies to the potential for the recent *Homes for Heroes* initiative to be tied as a programme to a modular delivery model at scale.

For developers, the benefits of working with modular manufacturers accrue so that after several projects together, continuous improvement and product development go hand in hand. When organisations work together over longer periods, lessons learned are not stored in project relationships that are not renewed; rather, quality improvements and cost reductions accumulate over a programme.

The closest relationship is where development risk and delivery is combined within one vertically integrated organisation. As we have seen, many modular manufacturers have become developers or development managers to create pipeline for their factories: Tide/Vision, Ilke, Top Hat, and Legal & General Modular Homes are all delivering multi-tenure projects of their own increasing scale throughout the UK. We also have a reverse situation where development led businesses have elected to become vertically integrated modular manufacturers, including Urban Splash, Berkeley Modular and Swan/NU Living. The net effect is the same in terms of being able to overcome the barriers of a transactional interface separating land and manufacture as previously described.

The public sector shows greatest evidence of moves towards multi-organisation aggregation, perhaps buoyed by numerous examples of past efforts to increase collaboration between combined, unitary and local authorities and also housing associations. This could be further encouraged by the forthcoming Devolution and Recovery white paper expected in the autumn.

We highlight some examples as follows;

London Councils led a 2017 research project into the potential for a collaborative delivery vehicle [CDV] to support increasing housing delivery in the capital by brokering solutions across administrative boundaries. The consultation included 20 authorities together with the GLA, The Cabinet Office, HCA [now Homes England], DCLG [now MHCLG], CIPFA and others. It resulted in a costed plan ready for implementation that acts as a template. There is now a refreshed opportunity for the GLA and London Boroughs to strategically collaborate across the City in the delivery of Precision Manufactured Homes.

Bristol City Council and The West of England Combined Authority have established a five-year Housing Festival to explore MMC housing initiatives on council land including some that will be delivered using modular techniques. They are in discussion with other authorities to share their experience. More recently they received a boost of Innovate UK funding to support a programme with nine manufacturers.
www.bristolhousingfestival.org.uk/projects

There are also examples of multi sector collaboration such as at The Hertfordshire LEP [Local Enterprise Partnership] formed of housing associations and local authorities, which has announced plans to build 3,500 homes and have selected a modular and MMC partners.
www.hertfordshirelep.com/media/6783/ez-hertfordshire-offsite-manufacturers-prospectus.pdf

The Housing Association Sector is also starting to think about how it can collaborate to unlock the MMC opportunity. Building Better is a current initiative born out of a National Housing Federation innovation programme that has set itself up with this primary aim. So far 18 housing associations have come together to explore how they can share learning and unify their approach to market engagement so as to become a larger composite client to the MMC industry with 'borrowed scale' **www.housing.org.uk/our-work/building-new-homes/building-better/**

These approaches are all building collaboration for long-term programmes, creating relationships with manufacturers around a pipeline of land across a number of authorities acting as an 'intelligent client' committed to continuous learning.



Bristol

Promoting modular on council land has seen a number of innovative projects supported as part of the 'Bristol Housing Festival'. Bonnington Walk has 190 homes being delivered by Legal and General Modular Homes and a further 188 homes are being built by BoKlok.



The Institution of Civil Engineers (ICE) defined an intelligent client in 2014: "The capability of the client and its relationship with stakeholders, both the sponsor organisation and the supply chain, has a direct effect on the achievement of efficient and sustainable outcomes." Intelligent clients are firmly at the centre of efficient, productive, value-for-money relationships with the sponsor and supply chain. While it is recognised that varying operating and delivery models impact the breadth and depth of the required client capability, the term 'Intelligent Client' crucially refers to the capability and capacity to manage the process of translating policy into outcomes.

With such a wide range of emerging activities engaging with and procuring modular delivery, we feel that clients would benefit from the establishment of the more strategic brokerage and integration platform that we have already referred to which can easily overlay existing initiatives such as Building Better and avoid competing with or cutting across useful work in progress.

One of the challenges to delivering modular housing in the public sector has been the plethora of frameworks and complexities of procurement and associated costs that evolved over the last decade. Some are progressive, but unfortunately how the frameworks are used as part of a wider procurement process is still subject to a fixation with lowest capital cost and a lack of willingness to engage early enough to drive Design for Manufacture & Assembly (DfMA) optimisation. Modular manufacturers are often prevented from direct involvement in public housing delivery unless partnering with a contractor or developer large enough to access delivery frameworks or to enter open tenders, both of which add significant costs and, sometimes, delivery difficulties. Many are disinclined to engage with frameworks and instead align their factories to small delivery pipelines which is ultimately limiting the growth in the market for reasons already covered.

Ultimately procurement reform requires behavioural and technical re-education or upskilling and there is also a role for Government to 'lead from the front' in how it procures its own works programmes. Public sector procurement needs to move to a more balanced scorecard, outcome-based approach that would benefit high quality modular delivery much more than traditional approaches. The Construction Innovation Hub's new Value Toolkit is a demonstrator for how procurement models can be redefined by intelligent clients and we propose this type of approach sits at the heart of any larger scale demand and supply side integration and aggregation platform with a 'dynamic purchasing' form of technology enabled procurement evaluated against multiple criteria which can be tuned up and down by individual clients but only within pre-determined boundaries to avoid 'race to the bottom' outcomes.

Whilst it is early days, it is encouraging that there are frameworks emerging based on experience of modular delivery that demonstrate more than just a list of manufacturers. The Northern Housing Alliance and LHC have formed a partnership to establish an 'Integrator Framework', selecting 9 consultants to be available to advise on MMC and modular system selection. This service is available to the public sector nationally and has just been launched.

Meanwhile, contractual relationships for modular residential delivery are being adapted from traditional forms and are not fit for purpose for collaborative engagement. Law firm Trowers and Hamlins LLP supported the CLC Building Innovation work stream alongside Kings College London to examine these new relationships and how to adapt standard forms.

These more innovative and progressive contracts reflect earlier and closer engagement with manufacturers, for instance the ACA Framework Alliance Contract, (FAC 1) for long term strategic relationships enabling one or more clients to integrate housing programmes that are delivered through smart construction linked to separate design, construction and operation contracts. For developers that do not want to aggregate programmes with other housing providers, but do want to collaborate with their supply chain on a series of modular and off-site projects, the Term Alliance Agreement (TAC -1) is an option and we note that the London Borough of Greenwich, in its recently announced strategic agreement with Ideal Modular, is using the TAC-1 contract.

"Existing procurement processes for construction that are complex, lengthy and costly and non-value added are not appropriate for off-site manufacturing."

Stephen Trusler – Residential Sector Leader, Laing O'Rourke

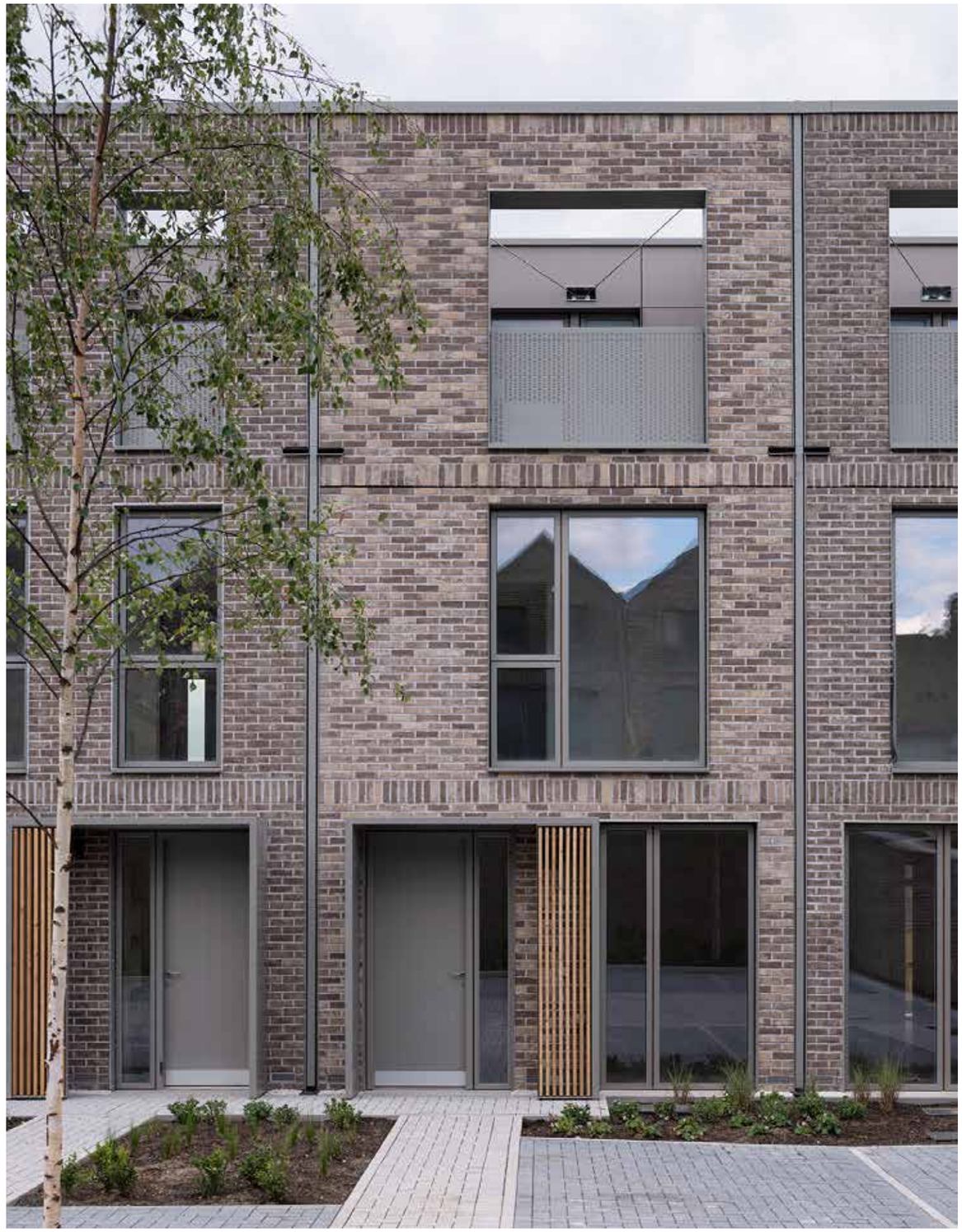
Choosing a contract form which engenders collaboration is critical when adopting modern methods of construction.

The housing sector, through any demand stimulation programme, needs to adopt and test these forms but also to establish a new best practice in delivery of manufactured homes through design and product definition and collaboration.

There have also been numerous attempts to establish a 'design aggregator' to unify fragmented sources of demand for modular homes from diverse organisations. A series of generic rules would define function, form and space in a best practice residential design context.

Design based 'parametric processes' help to base early design in a form suitable for modular manufacture. Arcadis has invested in a digital modular parametric tool for mid to high rise developments and combines basic design with cost and customer interfaces. Meanwhile, an open source City wide level tool has been developed for the Greater London Authority in conjunction with Cast, known as PRISM. This tool now includes comprehensive London wide geospatial data that can assist with, not just optimising design for manufacture against a range of system types, but also can identify logistics and delivery constraints such as low bridges and narrow roads. (www.prism-app.io)

Kitchener Barracks. Developer and Modular Manufacturer: TopHat



New Islington Manchester

Urban Splash set out to engage in modular delivery on this project 5 years ago with 43 homes on a regeneration site near to the city centre. They have defined a design led approach which created a new market with customisable homes now being developed on sites across the UK.
Developer/Contractor Urban Splash. Modular Manufacturer – HOUSE by Urban Splash. Architect - Shed KM





HTA and Cast have also been working with the British Standards Institute (BSI) to develop proposals for a Modular Housing Design Standard in the form of a Publicly Available Specification (PAS). This PAS sets out key design parameters to ensure a scheme is well suited to offsite systems. It takes a 'systems agnostic' approach so design teams can be commissioned to work up schemes suitable for delivery by a range of offsite manufacturers or suppliers.

Such tools have their place at initial project stages to inform early principles and manufacturer selection. They do not replace early engagement with manufacturers, and working with experienced architects and consultants who understand how to be 'designers in industry' ensuring that design is optimised for the chosen system or systems and developed to support a programme of demand.

Design quality and lasting performance should be an absolute for residential development in the UK, the that fact it is modular should be secondary to making a beautiful home, designed first and foremost to create the best possible living environment and one that responds well to the local context.

Finally, it is worth noting that there is some further recognition of the need for aggregation and collaboration, most recently illustrated by London's Housing Delivery Plan, published in July which contained the following recommendation from the Taskforce;

'The GLA and councils should work together to test the opportunities to procure precision manufactured homes at greater scale and in a more standardised way, building a pipeline of demand to support manufacturers, and giving confidence to new entrants to market. The Taskforce believes that this intervention would be enhanced by concurrent direct investment in the precision manufacturing market, from GLA and Government, to support businesses to expand their operations and develop new environmentally friendly products that can help all work towards a zero-carbon future.'

These initiatives to promote collaboration and aggregation, and many others like them, were initiated in the pre-Covid 19 era but are even more relevant now. Most are modest in aspiration and funding. Experience so far has been that, without some external pull, organisation to organisation collaboration and aggregation has been very difficult to effect. Post Pandemic, there is a new urgency to accelerate and scale up and even to bring together some existing initiatives as well as encouraging others. To do this requires Government support and the use of its agencies and available incentives.



Kitchener Barracks, Chatham

This 300+ unit masterplan development on the site of the former Military School of Engineering uniquely combines sensitive retention of heritage buildings with the development of new modular homes across a range of typologies including terraces, town houses and mansion block apartments. The high quality public realm impressively links the development together and creates a true place and community that shows how design led modular homebuilding can be made to work on a complex and constrained site.
Developer and modular manufacturer/ contractor -TopHat



3.6 Creating Demand Resiliency - Developing a diverse rental market and making multiple routes to home ownership achievable.

None of the measures to create improved quality and speed of production will be fundable unless they are aligned to real demand from the outset. But that constraint provides a unique opportunity to financially model and develop innovative, market-facing tenure products, with Government backing, that allow people more choice from renting to outright home ownership and enable time sensitive transitioning in between.

Any such product range should embrace the proposed *First Homes* initiative but look to better harness its effectiveness in reforming the basic modes of delivery through programmatic delivery of nationally harmonised pattern book designs that can then be localised via the design code approach advocated in *Planning For The Future*.

We need a housing market that requires projects to be completed at scale, speed and quality to ensure financial return. The challenge is to create a housing strategy which is also an industrial strategy, driving wider outcomes for the economy and society.

To do this, we need to look more to business models that derive value from income generation over the long term linked to either yield based returns, or low-cost routes to home ownership that will underwrite higher levels of market absorption than open market sale alone.

We see Sir John Armitt's important intervention in the debate as underlining our call for more diversified sources of delivery to be linked with modular solutions, an approach that also echoes findings of the 2018 Letwin Review. This requires a dramatic addition to planned Government support for housing investment in England over the next five to ten years.

The recent Select committee report 'Building More Social Housing' (July 2020) calls for a 90,000 home, £12bn per annum programme to meet demand. Clearly such a major programme would support a significant prospect for manufactured delivery if adopted.

"To get to 300,000 personally, I don't see how we get there in a meaningful way without some sort of government intervention with local authorities, or with the housing associations, to deliver more affordable homes on a large scale."

Sir John Armitt, Chair of the National Infrastructure Commission July 2020

Although not at this level of ambition we are highly supportive of the recent confirmation that the £12bn 2021 - 2026 Affordable Homes Programme will be more closely aligned to promoting MMC adoption as part of Homes England's strategic plan objectives to improve industry productivity and diversify the market.

The market needs greater diversity and innovation of tenures, from social, intermediate and market rental in perpetuity to those that can migrate to shared ownership and sale. The ability to retain an ownership aspiration while offering choice on when to commit to part or outright purchase is key. We are conscious that some of the schemes previously proposed for such approaches have not always worked well, so there needs to be a robust assessment of new models that can be funded, including in partnership with institutional capital markets.

Government should look to see how renters can better leverage their rental expenditure towards building an ownership credit which can act as an equity deposit, either for the same home or a different one. There are clearly also opportunities to innovate new housing products for the later living market as well as the first-time buyer market that all act together to increase transactional volumes and the wider health of the housing market. This is all historically proven to drive up total new build activity.

Such a new push to design a rent to purchase model was trailed by earlier initiatives such as the Gentoo Genie, supported by the Prime Minister when he was Mayor of London. One of our consultees, Sovereign is working on such a model and there is already support from local authorities in its potential.

"We need infrastructure housing, modular manufactured and built at scale by collaborating local authorities, giving local people the right to rent but also the right to invest in their homes for their future security"

Darren Rodwell- Leader London Borough of Barking and Dagenham

There have already been private investor backed versions of rental models , Legal and General have been exploring a Institutional Affordable Housing Guarantee Scheme pathway to ownership model which, if backed by the existing government guarantee programme, would deploy a minimum of £1.6bn of investment into a new intermediate rent product, allowing residents to save a deposit.

This rebalancing is fundamental, and the scale will need to be significant, and reach across all tenures, public and private, to create the proposed pipeline for 75,000 additional modular homes a year by 2030.



Padnall Lake, Chadwell Heath

Be First, wholly owned by Barking and Dagenham Council, are developing 300 affordable homes on council land using modular delivery. Part of an ambitious plan to increase the use of modular delivery throughout the borough. Developer- Be First. Architect- HTA Design LLP.



4.0 BRINGING IT ALL TOGETHER

4.1 Government directs, Homes England pushes, industry responds

Much of what we have described so far, including the mechanisms for leading the structural change to housing delivery and greater collaboration, is already in place in embryonic form. Arguably, a step-change was already underway in modular delivery, pre-Covid. MHCLG [Ministry of Housing, Communities and Local Government] has proved supportive in the evolution of MMC, mostly through Homes England facilitation via public land, grant and investment programmes. Meanwhile BEIS [Department for Business, Energy and Industrial Strategy] has been playing a key role in driving forward the Construction Sector Deal which includes manufacturing as one of its three core themes. This has primarily been focused on how to leverage the role of the Government's own capital programme and working with the wider construction industry to push a modernisation agenda.

'Building a stronger, greener future by fighting coronavirus, tackling climate change, unleashing innovation and making the UK a great place to work and do business'.

BEIS Website

"Building the homes the country needs is a priority for the Government and modern methods of construction have enormous potential to not only accelerate this work but to deliver better quality homes too."

Housing Minister Rt Hon Christopher Pincher MP

We have seen that there is increasing modular residential activity in both public and private sector, but it is un co-ordinated and lacks the shape and size of demand required to lead to a sustainable market. Further incentives or nudges from Government and its agencies are required to galvanise this into a transformative movement for housing delivery. Embracing modular manufacture can lift delivery as part of the nation's post pandemic industrial strategy.

As has already been set out, we believe greater collaboration and aggregation can provide and deliver a consistent pipeline of new homes. MHCLG, BEIS, Homes England, the Infrastructure & Projects Authority, the Construction Innovation Hub and the Construction Leadership Council can and should join forces with increased focus to promote acceleration of this in the housing sector.

When the Government and its agencies set expectations and ground rules, both the public and private sector will deliver. From English Partnerships bringing forward land and initiatives such as Design for Manufacture and Zero Carbon, to Homes England's support for MMC, we have seen in previous years the direct impact Government can have in raising standards and speed of delivery in housing.

Homes England has ramped up its presence in the housing market and taken control of some significant landholdings, channelling these from other initiatives such as One Public Estate as well as making its own acquisitions. They have built up national capacity to become a key force in the housing market, even investing in or supporting modular manufacturers such as Urban Splash and Ilke. In launching the MMC Pilot 2018, comprising eight publicly owned sites, Homes England said:

'Government recognises that it needs to play an active role in championing the use of innovative building for a diverse range of MMC types. This is likely to include a mix of panelised, hybrid and volumetric build systems.'

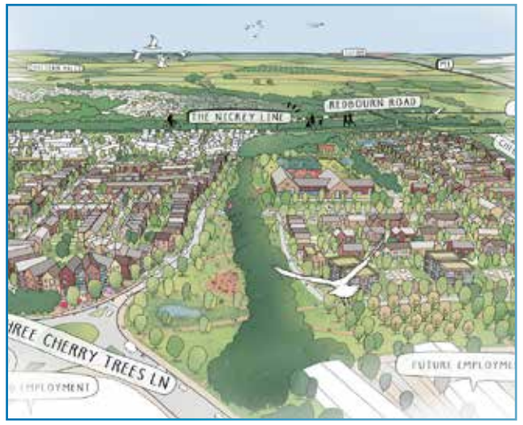
As part of this programme Urban Splash and Sekisui House are delivering 406 homes in Northstowe, and, at Spencer's Park, Countryside and Swan NU Living will develop 390 homes using MMC and modular delivery.
This pilot programme involves systemic research & development and data collection in collaboration with the Building Research Establishment, Atkins and University College London [May 2020], to create a valuable evidence benchmark for MMC. However, we need to go further if we are to accelerate and to meet the challenge we face, taking the opportunity to embrace the potential of more strategic collaboration, aggregation and integration between demand and supply and to reshape the market for delivery at scale of modular homes.



Hanham Hall, Bristol

One of the Government's flagship Carbon Challenge schemes and England's first large-scale housing adapt to include MMC as route to zero carbon scheme to achieve the 2016 zero-carbon standard. The 185 home scheme was voted Best Sustainable Development in Britain in the 2014 What House? Awards. Developer -Barratt Developments. Architect- HTA Design LLP





Spencers Park, Hemel Hempstead Hertfordshire

As part of the Homes England support for MMC this project will see Countryside and Swan NU Living develop 390 homes using modular and panelised approaches to explore the benefits of different systems across the site. Developer – Countryside, Modular contractor/manufacturer Swan NU Living. Architect - HTA Design LLP.



Recent comments from Homes England confirm that it stands ready to take up a central role in housing recovery and will continue to promote modular and other factory production approaches to build a more resilient, diverse and productive housing sector. Our ambition is to see this action have the biggest long term impact and to be strategically aligned to market transformation, rather than cautious and smaller scale interventions. This, of course, in turn needs political leadership and direction, preferably on an apolitical basis that can provide longer term confidence and consistency of approach.

Homes England is uniquely placed to help coordinate a demand side stimulus for modular and to facilitate, lead, challenge and enable the housing sector further.

To date much of the public land coming forward has been predicated on housebuilder return on capital models, often requiring concessions and subsidy to ensure the private sector meets any set objectives for innovation. or design quality. We are pleased to see that Homes England have recently supported the *Building For A Healthy Life* toolkit as part of a move to more balanced qualitative as well as commercial outcomes.

In a similar vein, the agency could also further scale up the ambition of its own MMC activities, including moving more formally to making higher pre-manufactured value a broader prerequisite for development on its land. This would potentially benefit modular on appropriate sites but would in reality promote all 7 categories of MMC as defined by MHCLG in an intelligent and dynamic way.

Many Homes England sites could also be bought together in an overarching programme linked with modular and MMC objectives, rather than a series of independent transactions and this would be in the same way that Homes England's MMC pilot programme has been designed. This should be a template followed for much more land release to a more diversified market.

Homes England focus can also help address specific remaining areas of 'market failure' already noted in this report. These include development finance and securitisation issues, reinforcing standardised use of terminology and language and the promotion of harmonisation of design and performance parameters. In certain instances this may well require Government support to allow the agency to be more creative in its market making function.

Value-based procurement and dynamic purchasing as part of the next evolution of Homes England's engagement with the modular market also has potential to drive enhanced outcomes. Combined with a more programmatic treatment of land and investment it could form the centre piece of the national modular aggregation and integration platform already described, bringing in Housing Associations, local and combined authorities as well as private developers and investors.

This could also include the establishment of a pre-qualified and technically vetted MMC framework, albeit one sensitive to the barriers that frameworks can present to innovative suppliers. A modular and MMC framework that is responsive to national, regional and local needs and reflecting the different stages manufacturers are at. This could differentiate between manufacturers that are experienced, with a strong track record of completed and occupied buildings, and new entrants or those with little track record in delivery but have still demonstrated their product and process credentials.

As a route to this end goal, there is a huge opportunity to refresh the Delivery Partner Panel (what will become DPP4 next year), to add in more innovative developer/manufacturers including modular turnkey delivery organisations from both the public and private sector.

We have already noted that, to benefit from those with longer term investment models, there is a need for a fundamental shift in procurement, which is currently predicated on maximised land receipt for the public sector from mostly private sector partners, making sufficient short term profit to justify the costs involved. As demonstrated by West Midlands Combined Authority as well as Newcastle and Bristol Councils, there are already progressive emerging models that actively seek aligned, long term investment and delivery partners procured based on broader outcomes.

A further area raised consistently by consultees is a call for 'fast tracking' modular residential delivery through the planning process. Planning should be agnostic to the method of build but due to the critical link between harmonised designs, planning consents and manufacturing programmes, modular delivery that links to accelerated planning approvals and speed of delivery post consent through type approval or passporting can significantly compress overall development programmes with demonstrable benefits of less disruption to local people than traditional construction, as well as lower carbon and higher quality outcomes. We have already repeatedly signposted the positive impact that the proposed *Planning For The Future* reforms could have in this regard and such planning reform could embed better technology enablement and include a hard link between design code compliance and pre-approved manufactured turnkey housing solutions that have met technical & aesthetic quality standards and are conditioned on physically being able to deliver more quickly than traditional build.



Magna Housing Pattern book homes

Magna Housing, a community-based housing association working in the South West, have worked with residents to create a 'designed for manufacture' pattern book. They are working with modular manufacturer 'Rollalong' to deliver the programme. The approach echoes recent announcements by government regarding planning reform to speed up delivery and the potential of design codes and pattern books in the delivery of new homes in a range of sensitive community settings.



There is also a greater potential to facilitate the customisation of designs within agreed rules-based planning parameters. There are many examples showing how modular delivery can produce high quality architectural and place making solutions and Planners should increasingly be made more aware of the potential of this.

We would highlight a progressive approach being currently developed in Dorset where Magna Housing Association in conjunction with their manufacturing partner, Rollalong, are currently agreeing with Dorset Council how a pre-approved pattern book of typologies with residual conditioning re external materials selection, can form the basis for accelerated consent. This will then enable the forward ordering of modules by Magna to be held in stock. These can then be drawn down as various sites for themselves and other partners who want to collaborate in a purchasing consortium are developed. All of this is planned in one of the most architecturally sensitive areas of the country and will minimise impact on communities and accelerate delivery.

Finally, the positive relationship between modular delivery and sensitive locations could not be better illustrated than projects at Chapter White City in Ealing, London where a long vacant site was transformed featuring stunning brickwork while in Bath, the world famous local vernacular was not a barrier to factory based delivery.

High quality modular *systems* that are responsive to local context that enables great design are essential to the success of a manufactured residential future.



Green Park House, Bath. Developer: Berkeley Homes. Modular Manufacturer: Elements Europe. Architects: Stride Treglown



Beautiful brickwork at Chapter White City, East Acton. Developer: Tide Construction. Modular Manufacturer: Vision Modular Systems. Architects: HTA Design LLP

5.0 CONCLUSION AND ASKS OF GOVERNMENT

5.1 Conclusion

This report is about creating a more sustainable and resilient housing market that works immediately for a post Covid-19 world and which is enabled by a modern and innovative industrial strategy.

All of this can be aligned to existing policy initiatives or already proposed regulatory changes including planning and Building Regulation reforms. It can also accord with The Future Homes Standard, The Fire Safety Bill, The Building Safety Bill as well as the New Homes Ombudsman or the wider desired outcomes from the Construction Sector Deal and Transforming Construction programme.

This paper purely suggests a housing policy that is better synchronised at scale with industrial strategy objectives and the coordination of support between BEIS, Her Majesty's Treasury, MHCLG and Homes England. Also, it promotes the enthusiasm and commitment of organisations and authorities already working hard to promote innovative partnerships, and utilising modular manufacture.

The report is rooted in the experience of not just the authors but our consultees. They deserve recognition and encouragement as well as the wider policy support to grow and scale up.

The biggest challenge is in moving quickly to the aggregation and integration platform needed to re-shape the modular market and in the tenure innovation and associated funding models that will underpin more sustainable and stable demand.

Everything depends on building that resilient and demand led market that immediately absorbs the new homes that our economy needs to be urgently delivering now as part of its post pandemic stimulus. Creating an additional 75,000 new homes a year by 2030 could add 0.75% to our GDP annually..

Bringing the strands together and helping create a joined up and collaborative approach will make a difference and will contribute to a better future for our country.

In conclusion;

- **The country needs to build more new homes.**
- **Despite initial pent up demand creating a short term lift, the pandemic is expected to negatively impact the housing for sale market.**
- **The Government and public sector have land.**
- **Rental or part rental housing models are more acyclical and can absorb at more consistent levels irrespective of broader sale market fluctuations.**
- **Rent to purchase and discounted sale models including *First Homes,* can enable home ownership as wider economic conditions recover.**
- **Investors are keen to put money into rental housing of all tenures.**
- **Modular manufacture is the biggest single gamechanger when it comes to additionality of new housing supply.**
- **Government support and investment into modular delivery of homes will diversify the market including enabling a new generation of innovators from SME's to large UK and international businesses investing and operating in the UK to offer more choice to the market.**
- **Modular Manufacturing can help deliver the UK Industrial Strategy's skills, productivity, technology and Carbon reduction objectives.**
- **An era of great design and placemaking can leave a positive physical legacy and economic benefit.**
- **There is a realistic ambition to deliver 75,000 additional homes per annum to the market that becomes an international exemplar in innovative housing delivery and drives standards in the rest of the new build housing market.**

5.2 Our asks

In writing this paper we have sought to place modular housing delivery at the heart of the Government's post pandemic industrial strategy and hopefully influence building blocks that might be laid in the Spending Review, due to be announced in the Autumn. Our asks, derived from our experience as practitioners as well as from research with consultees, are rooted in greater collaboration to re-shape the market to face the challenges ahead. We need a plan that joins up Government and its agencies with housing procurers and deliverers at an unprecedented scale. A strategy that also calls for targeted Government subsidy, investment, land release, planning reform and tenure diversification.

This will promote the manufacture of great housing to meet both latent current and future demand whilst creating new jobs and building a green recovery.

The Government

SUPPORT AND LEADERSHIP
We need continued and amplified signals of support for modular manufactured housing & MMC.

1. The Prime Minister's recent 'New Deal' speech at Dudley College, which took place next to a modular manufactured showhouse, launching 'Project Speed' highlights many of the attributes described in this paper. We need the Government support for modular manufacture to now go further in terms of policies and deeds and an ambition that this can become of a 'win – win' centre piece of the UK's economic recovery policy. This direction of travel was suggested by the Chief Secretary To The Treasury in his recent speech to the think tank, Onward, and we believe the time is right for substantive action.
2. There needs to be a policy led recognition of the importance of both institutionally and public sector funded rental, discounted purchase and other innovative solutions as being a more resilient counter cyclical path to scaling up housing delivery in the post pandemic period. This is not about ideology or dogma, this is about an apolitical long term solution to housing that includes as much choice as possible and in so doing, maximises absorption of increased new stock delivered by a wide spread of market actors.

The Department for Business, Energy and Industrial Strategy (BEIS) & Her Majesty's Treasury (HMT)

TRANSFORM PRODUCTIVITY & EMPLOYMENT OUTCOMES
We call for BEIS and MHCLG to coordinate modular homebuilding activity as a primary lever for implementing the levelling up agenda, delivering value through inward investment, training and job creation using industrialisation and manufacturing principles. It is an area that needs to be supplemented to the homebuilding sector element of the CLC 'Roadmap for Recovery' and a lost opportunity to not just rely on infrastructure and commercial construction as a driver for construction modernisation as part of the 'restart, reset and reinvent' maxim.

BEIS & HMT need to be involved in enterprise and finance engagement with the modular manufacturing sector and help build a fast track public/ private investment programme to lift capacity to deliver 75,000 additional homes per annum by 2030 to underpinning National, Regional and Local industrial strategies. Measures include;

- Support for those who have already invested responsibly in factories and machinery to create existing production capacity. The need to support and nurture the high quality component of what we already have is a key springboard to future growth.
- Direct support for local industrial strategy proposals that would support the objectives of this paper including, for instance, the West Midlands Combined Authority Advanced Manufacture in Construction (AMC) ambitions to deliver a national skills and training impetus through their Higher Education Further Education (HEFE) capabilities as well as funding for a new facility which can promote multiple SME collaboration to manufacture sub-assemblies and modular products by bringing traditional build SME's together as a consolidation centre / pre-manufacturing model as described in this paper.
- Underwriting performance bonds and payment / credit guarantees to give surety to clients procuring from modular manufacturers and assist credit lines and cash flow for manufacturers.
- Helping support the underwriting of warrantees and insurance to speed up the confidence building needed in the domestic mortgage, asset backed investment finance and building insurance sectors.

Ministry of Housing, Communities and Local Government (MHCLG) & Homes England (HE)

RESHAPE THE SUPPLY & DEMAND CHARACTERISTICS OF THE HOUSING MARKET TO ENABLE MODULAR DELIVERY AND TACKLE 'MARKET FAILURES'

Many collaboration and aggregation initiatives were established in the pre-Covid 19 era. Most are modest in aspiration and funding and this paper seeks a step change in commitment and vision. Post Pandemic there is a new urgency to accelerate and scale up and even to bring together some existing initiatives as well as encouraging new ones. Consistency of message regarding funding, land disposal, planning and procurement processes are required. Overwhelmingly consultees ask for financial incentives to support the advancement of MMC delivery and to encourage aggregation and collaboration, while also help in demystifying MMC delivery.

1.Grant, subsidy and investment

- The Chancellor has announced that 'a proportion' of the Short-Term Home Building Fund, will be reserved for innovative approaches to housebuilding and MMC. While welcome, this needs to go further and ensure it is focused on strategic demand side stimulation not fragmented capacity building before existing capacity is fully utilised or joined up. For the Autumn Spending Review we call for an enhanced Affordable Housing Programme, echoing that of the recent select committee report '*Building more social homes*' (July 2020), with an incentivised grant regime favouring, or even in certain appropriate instances mandating, modular delivery and a *First Homes* initiative that is better targeted at increasing the use of modular solutions. The use of a dynamic and intelligent decision-making model that can flex for different criteria will avoid a 'one size fits all' approach that may lead to unintended consequences.

- We also ask for a specific funding pot via devolution to support authorities coming together to increase aggregation in their demand with associated targets to increase modular delivered homes, encouraging greater collaboration, sharing and adoption of modular best practice, joint procurement and supply chains in housing delivery.

2. Collaboration and aggregation

- We ask Homes England to lead the formulation of a public / private sector multi-stakeholder collaboration, aggregation and integration platform for modular housing delivery. Where it is already happening in pockets such as through initiatives including Building Better, and convening organisations, Offsite Alliance and Buildoffsite harness and bind together as part of a bigger picture. Identify what funding and support is needed to scale this up and organise resource accordingly. This is one of the biggest enablers of re-shaping the market to work for modular manufacture and will require a wholesale re-prioritisation of Homes England's market engagement function which should move more to market making.

- As part of this initiative look to lead and drive a demand led transformation of supply side product development which recognises the fragmented and proprietary nature of the existing modular market but collaboratively develops a road map towards appropriate incremental standardisation of design, spatial and functional principles that in turn improves inter-operability and supply chain resiliency.

- Use latest thinking in procurement, alliances, frameworks and management that needs to sit at the heart of this platform.

3. Intelligent planning system reform

- Harness the opportunity provided by the *Planning For The Future* white paper to signpost and promote how more rules based and codified planning can better unleash the potential for modular to accelerate overall delivery through pre-approval aligned to design quality and community acceptance.

- Promote recognition of the delivery and quality benefits of modular to planning authorities and encourage fast tracking of planning process.

- Explore how digital planning can better work with digital manufacture to transform the development process expanding the discussion from 'Proptech' and 'Plantech' to embrace the links to MMC digital design and manufacture.

- Planning conditions re local employment to be better reflective of wider national objectives of levelling up.

4. Improving the underwriting of modular and MMC solutions via assurance and warranty that provides comfort to the development & asset finance sector and the insurance market

- Work with specialist lenders and use the Home Building Fund to specifically provide increased capacity for modular friendly development finance that can cope with the advance payments and securitisation profile of offsite construction.

- Work with Housing Associations, lending banks and valuers to help resolve the asset securitisation issues still facing the Housing Association sector related to modular portfolios including possible consideration of guarantees or other financial instruments.

- Continue to support the recently announced MoU between the major warranty providers and the establishment of new MMC assurance products such as NHBC Accepts and encourage technical assessment convergence with other established products such as BOPAS. Use Government land and funding programmes to condition minimum levels of such technical accreditation for modular products.

5. Quality & Finance First

- Lingering technical and underwriting concerns regarding MMC system design and materiality should be addressed in full collaboration with the relevant stakeholder bodies including the insurance and fire safety sectors. New products and systems have to have a quality and safety first approach in all instances. Expand enablement of modular delivery through Homes England's ability to use its land and investment tools.

6. Public Land Disposal & Procurement

- The next Homes England Delivery Partner Panel is shortly to open for new developers and contractors to help deliver programmes on public land. We ask that the list is widened out to a broader base of delivery bodies including more integrated modular led developer / contractors and also partners offering a wider range of tenure options.

- We ask that Homes England create a supplier framework of pre-approved Modular and broader MMC systems.

- We ask for Pre-Manufactured Value, consumer satisfaction and building performance to be key elements of procurement evaluation. This can be a dynamic purchasing type model to align to the distribution of grant, subsidy and investment described above. Furthermore, we recommend that this approach to procurement and decision making is used as a route map for land based programmes coming forward through local authorities, NHS and other land holding organisations and is recommended to local authorities and housing associations through formal public sector post OJEU procurement issued guidance from Government.

- Use of Pre-Manufactured Value and the MHCLG MMC Definition Framework should be embedded in the data collection and measurement of MMC uptake and its performance through Government programmes, including how the recently announced 25% minimum MMC target for Strategic Partnerships within the 2021- 2026 AHP is met.

7. Tenure diversification

- We suggest more detailed investigation of latest thinking in rent to purchase models to create a missing link in the pathway to home ownership to supplement the introduction of *First Homes*

- Any enhancement of AHP should implicitly support increased homes for rent. This will be important to getting the housing market delivering on all cylinders in a more acyclical way.

- Alongside public sector funding, there is an opportunity to also better incentivise the Build to Rent sector to further turbo charge high quality professionally managed rental products that can be delivered at a portfolio level and better suit modular delivery.

8. Benchmarking, Evidence Capture & Confidence Building

- Consultees feedback has made clear there is a need to quickly establish a transparent quality, process and financial benchmarking framework for modular housing – bringing together schemes recently completed as well as planned under accelerated timescale. Consultees have expressed interest in collaborating with Homes England to leverage the Homes England MMC R&D programme and to offer up new schemes to sit alongside the current study expanding and accelerating maturity of the dataset.

- Expand the MMC R&D programme by conditioning Homes England land disposal and access to investment and grant on the routine capture of data in the same format as templated in the MMC pilot programme.

- The results of this evidence building is to be systematically shared with the insurance and finance communities to inform underwriting risk and with the wider manufacturing sector to drive continuous improvement.

- Look to encourage and financially support 'Expos' or demonstrators being commissioned by different stakeholders that look to showcase best in class design and manufacturing of modular homes. Embed them into the Homes England MMC R&D programme and better publicise at Downing Street, Secretary of State and Ministerial level including on an international basis.

Consultees

In many ways the biggest ask is of those that have already contributed to this paper. Much of the great work we have discovered in our research is fuelled by local or business level ambition with similar thinking replicated throughout the country. Some are more advanced than others, many have not yet commenced, however the need for homes has never been greater. We call on those with this ambition to embrace modular and wider MMC delivery, to share and support each other, and collaborate to come together at an unprecedented scale in the way we describe in this paper, using each other's learning and initiatives to create a dynamic, virtual market place enabling a true scaling up in housing high quality housing and better outcomes.

6.0 CONSULTEES

Consultees

A 'coalition of the willing', our consultees represents the leading authorities and organisations in each sector referred to in this initiative. We draw on their enthusiastic support, mindful that there is some way to go before the proposition is fully formed and workable. This group will grow and be stronger as the opportunity grows to contribute progressively.

We wish to thank our consultees who represent the leading authorities and organisations in each sector referred to in this paper. On their achievements and commitment these proposals are formed and they are the bedrock of future housing delivery.

West of England Combined Authority - The West of England Combined Authority is a combined authority within the West of England area, consisting of the local authorities of Bristol, South Gloucestershire, and Bath and North East Somerset. The combined authority is led by the Mayor of the West of England.
Tim Bowles - Mayor
Greg Morgan - Joint Assets Board Programme Manager

Greater Manchester Combined Authority - Greater Manchester is a metropolitan county and combined authority area in North West England, with a population of 2.8 million; the third largest in England after Greater London and the West Midlands. Greater Manchester is governed by the Greater Manchester Combined Authority (GMCA), which consists of political leaders from each of the ten metropolitan borough councils, plus a directly elected mayor, with responsibility for economic development, regeneration and transport.
Andrew McIntosh – Investment Director

West Midlands Combined Authority - We are 18 local authorities and three Local Enterprise Partnerships (LEPs) working together to move powers from Whitehall to the West Midlands and its locally elected politicians, who know this region best. The Mayor has specific areas of responsibility including local transport and the region's 'more and better homes' agenda.
Gareth Bradford - Director of Housing & Regeneration

West Yorkshire Combined Authority | Leeds City Region Enterprise Partnership (the LEP) - The majority of our work covers the West Yorkshire local authority areas of Bradford, Calderdale, Kirklees, Leeds and Wakefield, plus the City of York. We manage a number of programmes that are delivered over a wider geography known as the Leeds City Region, including our Leeds City Region Growth Deal-funded projects and business support delivered through the LEP. We are currently investing around £2 billion, working with our partner councils to deliver better transport and housing, regenerate our towns and cities and protect our environment, making sure that what we do meet the needs of communities and help deliver local priorities.
Judith Furlonger - Head of Housing

Liverpool City Region Combined Authority - The Combined Authority is led by a Metro Mayor and brings together Liverpool City Region's six local authorities – Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral – to tackle the big issues that matter to us all, together.
Tim Jago - Lead Officer Housing Policy and Strategy

Sheffield City Region - The Sheffield City Region comprises the Mayoral Combined Authority (MCA), the Local Enterprise Partnership (LEP) and the SCR Executive Team. Housing growth is a priority for the Sheffield City Region. In the last three years we have managed to improve annual housing growth from just over 3,000 per annum to more than 6,000 homes being brought to market each year.
Becky Guthrie - Senior Programme Manager
James Illingworth - Head of Construction Research

Buckinghamshire Unitary Authority – A brand new council, fit for the future, created by combining the best of both county and district councils. This new council will be simpler, better value and more local to our residents. It will also have more clout to face head-on the great strategic challenges facing the county over the coming decades."
Gillian Quinton – Corporate Director (Adults, Health and Housing)

Bristol City Council - The council is a unitary authority, and is unusual in the United Kingdom in that its executive function is controlled by a directly elected mayor of Bristol. We have a population of about 463,400; the largest city in the South West. We are one of Great Britain's ten 'Core Cities'.
Marvin Rees – Mayor of Bristol

Manchester City Council – Our vision is for Manchester to be in the top flight of world-class cities by 2025, when the city will: have a competitive, dynamic and sustainable economy that draws on our distinctive strengths in science, advanced manufacturing, culture, and creative and digital business – cultivating and encouraging new ideas..
Joanne Roney - Chief Executive
David Houliston - Strategic Lead Policy and Partnerships

Newcastle - Newcastle is the most populous city in the North East, and forms the core of the Tyneside conurbation, the eighth most populous urban area in the United Kingdom. Newcastle is a member of the UK Core Cities Group and is a member of the Eurocities network of European cities.
Michelle Percy - Director of Place
Mark Ellis - Senior Housing Policy Practitioner

Northern Housing Consortium - We are a membership organisation made up of local authorities, ALMOs and associations that provide social housing for tenants. Not only does the NHC bring its members together to share ideas, we represent their interests and ensure they are heard at a regional and national government level. while we have a Northern approach to policy and public affairs, we know practical approaches to realising efficiencies and demonstrating value for money is not geographically restricted.
Tracy Harrison – Chief Executive
Brian Robson - Executive Director Policy & Public Affairs

The Hertfordshire LEP - We are one of 38 LEPS across the country tasked by the Government to accelerate growth. It is a partnership between Hertfordshire's 12 local authorities, businesses and the education sector. Our aim is to be a facilitator of economic growth and ensure Hertfordshire is Perfectly Placed for Business.
Tina Barnard - Chair of LEP Strategic Infrastructure Board and CEO Watford Community Housing

London Councils – London Councils represents London's 32 borough councils and the City of London. It is a cross-party organisation that works on behalf of all its member authorities regardless of political persuasion.
Dick Sorabji - Deputy Chief Executive

London borough of Barking and Dagenham - is a London borough in East London. It is an Outer London borough and the south is within the London Riverside section of the Thames Gateway; an area designated as a national priority for urban regeneration. It has a population of 211,998, the majority of which are within the Becontree estate.
Darren Rodwell – Leader, London Councils - Executive Member for Housing and Planning

Be First - Barking and Dagenham Council's regeneration arm- Our mission is to accelerate regeneration in the borough, so that no-one is left behind. We aim to ensure that 50,000 new homes are built, and 20,000 new jobs created in the next 20 years.
Pat Hayes – Managing Director

London borough of Lambeth – Lambeth, in south London, is one of a ring of thirteen local authorities which constitute Inner London. Lambeth is the largest inner London borough with a population of around 270,000, forecast to grow to 341,000 by 2021.
Andrew Travers – Chief Executive

London borough of Waltham Forest – Waltham Forest, in north-east London, is one of the greenest boroughs north of the River Thames. With 265,000 residents, forecast to grow to 300,000 in six years.
Stewart Murray - Strategic Director Economic Growth & Housing Delivery

The Bristol Housing Festival - A Public / Private collaboration forged on a relationship between Bristol City Council and The West of England Combined Authority. The Festival will run for five years during which new communities will be commissioned, funded and built across the city. The Festival intends to road-test a range of existing concepts and innovative solutions in the real-world helping to speed up the delivery of quality, affordable housing in the city. It seeks to share the experience gained with other local authorities across the UK.
Jez Sweetland – Project Director

Building Better - Building Better fosters collaboration and standardisation among housing associations, combining the sector's pipeline to buy homes from the offsite manufacturing sector. Building Better is a collaboration of housing associations in a strategic alliance supported by the National Housing Federation
Helen Greig – Project Director

LHC - LHC delivers a simple core service: We bring buyers and suppliers together, to build and maintain public property more efficiently and cost effectively, and to benefit the local community.
John Skivington – Group Director

CIPFA [Chartered Institute of Public Finance and Accountancy] - CIPFA, is the professional body for people in public finance. Our 14,000 members work throughout the public services, in national audit agencies, in major accountancy firms, and in other bodies where public money needs to be effectively and efficiently managed.
Rob Whiteman CBE -CEO
Joanne Pitt - Local Government Policy Manager

Planning Officers Society - We represent nearly 2000 individual planners working in 80% of the local authorities and public sector organisations around England. We can rightly style ourselves as "the credible voice of public sector planners in England. Our aim is to ensure that planning makes a major contribution to achieving sustainable development in ways that are fair and equitable and achieve the social, economic and environmental aspirations of the community.
Mike Kiely – Chair of the Board

Greystar – We have built up a significant high-quality rental housing portfolio of purpose-built rental housing across the continent. With offices in more than 50 cities serving more than 195 markets globally, and more than 693,000 units and student beds under management. The Greystar vertically integrated rental housing platform combines local market expertise with the power of a global investment, development, and property management platform.
Mark Allnutt - Senior Managing Director

Grainger - Established in Newcastle upon Tyne in 1912, we are proud to be the UK's largest listed residential landlord and a market leader in the UK build to rent and private rented sector (PRS). Our existing portfolio extends to c.9,000 homes worth over £2.9bn, and we are creating a further c.9,000 through our pipeline.
Michael Keaveney - Director of Land & Development

Pocket Living - Innovation is nothing new to us. We build space-saving, energy-saving features into our homes and we're always on the lookout for new ideas in building design. We're currently developing factory-built units to boost quality and deliver homes to city makers more quickly.'
Marc Vlessing – Co Founder and CEO
Alun Macey - Head of Construction

Sigma - Operating throughout the major conurbations of the UK, Sigma Capital Group is a leading provider of family Private Rented Sector housing. Our activities are focused on creating new communities through the provision of new, well located and quality family housing to rent – an important, yet neglected, element of the burgeoning UK PRS market.
Duncan Sutherland – Public Affairs Director

Legal and General investments - Our purpose is to improve the lives of our customers, build a better society for the long term and create value for our shareholders. We use our long-term assets in an economically and socially useful way to benefit everyone in our communities.
Pete Gladwell - Head of Public Partnerships

L&G Affordable Homes - With its long term, patient capital, Legal & General can pioneer a new way forward for affordable housing, bringing much needed social and economic change, together with the housing volume that society demands.
Ben Denton – Managing Director

Peachcroft - We specialise in bringing private sector institutional funding to public sector and quasi-public sector projects. This includes all types and tenure of housing from social, affordable, co-living, retirement, extra care and private rented (PRS).
Sudhin Chatterji – Director

Places for People - Place for people are a placemaking and regeneration company that takes a commercial approach to delivering social outcomes - this is what makes us different. We have taken a lead in deploying MMC though our wholly owned manufacturing facility at Modularwise and our partnering arrangement with Ilke Homes. Our balanced approach means we seek the right opportunities to optimise the advantages of MMC and hence achieve the best outcomes for our tenants and customers alike.
Chris Spiceley - Director Developments & Delivery Optimisation

L&Q - L&Q is a regulated charitable housing association and one of the UK's most successful independent social businesses. The L&Q Group houses around 250,000 people in more than 95,000 homes, primarily across London and the South East and through acquisition, Trafford Housing Trust which will facilitate £4 billion investment in creating 20,000 new homes across the North West.
Fiona Fletcher Smith Group Director - Development and Sales

Sovereign - We are a leading housing association, striving to provide quality, affordable homes in happy, successful places. We have deep roots in the south of England, with 58,000 homes focused in a core area covering Berkshire, Hampshire, Oxfordshire, Gloucestershire, Dorset, Devon, Wiltshire, the West of England and the Isle of Wight.
Tom Titherington - Executive Director Development and Commercial

Tide Construction & Vision Modular Systems - Tide Construction and Vision Modular Systems are global leaders in 3D volumetric, modular construction and are changing the landscape of housing delivery in the UK. Having delivered 6 million sqft of modular housing, hotels and student accommodation in recent years, with a further significant pipeline, continual refinement and advancement of our offsite technology has enabled us to deliver 44 storey modular buildings, with planning submitted for a 55 storey tower. The flexibility of our system ensures we can deliver a range of building heights and designs. With two manufacturing facilities and the capacity to deliver 6,000 units per year, our business plan is to increase delivery in line with inevitable growing market demand.

Our modular technology exceeds the requirements of heightened industry regulations with the additional benefits of a faster more dependable programme, well designed & higher quality homes, less disruption for local communities, and a safer and more sustainable method of delivery. All our projects are fully fundable, mortgageable and insurable.
Christy Hayes - Chief Executive Officer

Legal and General Modular Homes - We're part of the Legal & General group, which has a long history in housing – from retirement living to affordable housing, and traditional housebuilders CALA and L&G Homes.
Now we're challenging the conventions of the construction industry and changing the way homes are built. We make high-quality modular homes at speed and at scale – by taking a fresh approach to design, using modern manufacturing techniques and nurturing multi-talented teams.
Rosie Toogood – CEO

Laing O'Rourke Modular - Laing O'Rourke is challenging and changing the face of residential construction in the UK by extending its Design for Manufacture and Assembly (DfMA) philosophy to deliver fully complete housing units. The Group has begun work on a new advanced manufacturing facility, which, once complete, will have the capacity to produce up to 10,000 factory-built homes per year.
Stephen Trusler – Residential Sector Leader

Ilke Homes - Together, we're shaking up the housebuilding industry and tackling the housing shortage. By bringing together technology and people, we're creating wonderful places, designed to adapt to those who need it and to fit seamlessly with the local area.
David Sheridan - Executive Chair

Caledonian Modular Ltd - Caledonian is at the forefront of the offsite industry, with a long pedigree and the largest production capacity in the UK, with proven solutions to residential developers in both the public and private sectors.
Paul Lang – Chief Executive Officer

Swan Nu Living - We operate in Essex and East London and locally manage over 11,000 homes, with a secured development pipeline of 8,000 homes and an ambitious corporate strategy which aims to deliver an additional 10,000 homes by 2027. Under NU living, our in-house developer, we are building homes that are environmentally, socially and economically sustainable. Not least among its innovative projects is high quality modular housing built in our own factory under our NU build brand
Geoff Pearce – Deputy Chief Executive

Elements Europe - With recent investment from GS&EC, Elements Europe is uniquely positioned in the offsite construction market. GS E&C is a leading global construction company that has established its status as a top-ranking company since its foundation in 1969. Our design solutions include the ability to make each project bespoke, but optimise the amount of standardisation and repetition of modular and component parts ensuring the best possible overall solution.'
Simon Underwood - Chief Executive

TopHat – TopHat's leading modular technology platform integrates design, supply chain and manufacturing to ensure high quality, cost effective, low carbon, design-led homes.
Jordan Rosenhaus – Chief Executive Officer

Trowers and Hamlins - Housing associations and local authorities are the bedrock of our client base and we have long and enduring relationships with some of the largest and most successful. A trusted advisor – as well as handling complex transactions and legislative issues, our knowledge and know-how means we can take a step back and act as a strategic partner and sounding board for busy clients in this frenetic sector.
Katherine Saunders - Partner
Sara Bailey -Head of Real Estate

Savills - Founded in the UK in 1855, Savills is one of the world's leading property consultancies. We provide in-depth knowledge and expert advice across all property sectors. Across the industry we give in-depth insight into market trends and predictions for the future, to help make the right property decisions.
Robert Grundy - Head of Housing

Arcadis - With the impact of increasing urbanisation, the growth in new and emerging technologies and the spread of investment beyond London and into other regional centres are all affecting how the industry delivers. We help our clients not just to understand these trends from knowing which developments are financially viable to helping reduce risk, we work with our residential clients to help them make the most of their investment and development returns.
Richard Jones - Head of Residential and Regeneration
Simon Box - Consultant

Gleeds - Are a leading global property and construction consultancy. We've worked for many years on residential projects in major cities around the world. Our experience ranges from large mixed-use developments and affordable homes to key-worker accommodation and private housing.
We work with private and public sector partners, including local authorities and registered social landlords.
David Hutt - Director

Inner Circle - Inner Circle is a project and management consultancy. We work closely with public and private sector clients to deliver their objectives; which are often preparing their organisations for change or delivering growth.
Emma Peters - Director

3 Fox- 3Fox has been in business since 2004 when we started working with London Borough of Southwark, who remain a client to this day. The company has since worked with over 100 councils on place branding and inward investment campaigns. We specialise in creating collaborative relationships between local authorities and the private sector.
Toby Fox - CEO

Paul Beardmore – Recent past Director of Housing at Manchester City Council. Paul developed the City's approach to scaling up residential growth. He has also been working part time for the Association of Greater Manchester Authorities as a housing specialist, advising on the housing aspects of the Combined Authority status and more recently the Deal for Cities. Paul continues in his role as AGMA lead on housing and is keen to develop further the level of collaboration and joint working through Local Investment Planning.
Paul Beardmore - Independent Housing Consultant

Buildoffsite Property Assurance Scheme (BOPAS) - Non-traditional build brings challenges in terms of demonstrating to many parties including funders, lenders, valuers and purchasers that homes built from non-traditional methods will be durable and deliver the quality required. BOPAS was developed to address these concerns and perceived risks associated with innovative construction. BOPAS is recognised by the principal mortgage lenders as providing the necessary assurance underpinned by a warranty provision, that the property will be readily mortgageable for at least 60 years.
Jeff Maxted - Director of Technical Consultancy

NHBC - NHBC is the UK's leading warranty and insurance provider for new homes, setting standards for NHBC registered builders and working with them to help improve the construction quality of new homes. NHBC provides warranties for MMC builds, providing confidence in the quality of innovative construction.
Via NHBC Accepts, a newly launched certification scheme, manufacturers will be able to communicate to lenders and builders that their system is accepted for our Buildmark warranty.
Richard Lankshear - Innovation Manager, Standards, Innovation & Research

7.0 FURTHER READING

HTA Modular Housing Handbook https://www.architecture.com/riba-books/books/residential-and-domestic-buildings/houses-flats/product/9781859468654-the-modular-housing-handbook.html

The Farmer Review http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf

'Local Authority Direct Delivery' research by Morphet/ Clifford – [UCL/ RTPI June 2019] https://www.rtpi.org.uk/media/2043/local-authority-direct-delivery-of-housing-ii-continuation-research-full-report.pdf

Distinctively Local http://www.distinctively-local.co.uk/

Living With Beauty report https://www.gov.uk/government/publications/living-with-beauty-report-of-the-building-better-building-beautiful-commission

Bristol City Council and The West of England Combined Authority 5-year Housing Festival to explore modular housing initiatives https://www.bristolhousingfestival.org.uk/

Planning For The Future White Paper https://www.gov.uk/government/consultations/planning-for-the-future

Hclg Select Committe Report On MMC July 2019 https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf

House Of Lords Science & Technology Committee Report On MMC July 2018 https://publications.parliament.uk/pa/ld201719/ldselect/ldsctech/169/169.pdf

BUILD HOMES, **BUILD** JOBS, **BUILD** INNOVATION: A BLUEPRINT FOR A HOUSING LED INDUSTRIAL STRATEGY

Mike De'Ath

Mark Farmer