



# more | better :

an evaluation of the potential of alternative  
approaches to inform housing delivery in Wales

Dr Ed Green with Professor Wayne Forster

## executive summary



This report was funded by Welsh Government's *Homes and Places* division.

The full report can be downloaded at <http://orca.cf.ac.uk/98055/>

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# more | better

*Responsible government is not just about delivery in the here and now, vital though it is. It's also about looking towards the end of the decade and beyond, with a vision of the Wales we want for the future.*

Rt Hon Carwyn Jones AM, First Minister of Wales

There is a clear need in Wales for diverse, high quality housing that is not being met. This need is not likely to be met through volume house-building methods. There are also clear and emerging drivers for change, which should prompt legislators and commissioners of housing to engage in broader debate on the nature of new housing. This debate will include the process by which housing should be delivered, the standards it should be built to, and the ways in which performance, affordability and value should be measured. Among these drivers for change are increasingly stringent limits to energy consumption and carbon production, and an increasing public aspiration for quality, in terms of place, design, workmanship, fuel efficiency, longevity and, crucially, affordability.

Analysis of a range of case studies, combined with commentary from expert contributors, concludes that there is no single 'silver bullet', but that there is potential for more, better housing through a combination of innovative delivery pathways and construction techniques.

**The Well-being of Future Generations (Wales) Act 2015**, together with the Environment Act, demands a focus upon long term gains over short term expedience. The seven well-being 'goals' enshrined in the Act can be translated into a set of aspirations for housing development in Wales, as follows:

<b>A globally responsible Wales</b>	<b>Setting higher standards – reduced carbon footprints and energy-positive communities</b>
<b>A prosperous Wales</b>	<b>Developing an integrated all-Wales supply chain using local resources and a sustainable economy</b>
<b>A resilient Wales</b>	<b>Future proofing with long term flexibility, adaptability, ecological value and climate resilience</b>
<b>A healthier Wales</b>	<b>Reduced pressure on the health service through homes that promote physical and mental wellbeing</b>
<b>A more equal Wales</b>	<b>Eliminating household poverty by delivering affordable housing for all</b>
<b>A Wales of cohesive communities</b>	<b>Stronger neighbourhoods that support co-housing, self-build and cohesive communities</b>
<b>A Wales of thriving culture and language</b>	<b>Promoting diversity through Wales' unique cultural heritage, context and landscape</b>

The Welsh construction industry has access to innovative alternative construction techniques. Alone, these techniques cannot 'solve' the affordable housing crisis. However, combined with similar innovation in housing delivery, they could produce **more** housing that meets the above aspirations, in terms of building sustainable communities and making **better** quality homes accessible to households that are currently excluded from them.

## **no single silver bullet**

This report concludes that there is *no single silver bullet* to 'solve' the housing crisis. A range of approaches were evaluated. Each could deliver different benefits. Some benefits relate to project delivery (eg. affordability, reduced site time, fewer defects). Others relate to the development 'in use' (eg. reduced fuel bills, lower carbon footprint, energy generation). Other benefits impact on the wider context (eg support for local supply chain, community socio-economic benefits). Such considerations should inform choice of approach – fig.1.

Alternative approaches considered were *delivery pathways* (eg development partnership, community-led, self-build) or *construction techniques* (eg timber frame, offsite, modular).

## **delivery pathways** (full report, section 7.3)

The private sector, public/private partnerships, custom build, cooperative housing and self-build all have a part to play in the delivery of affordable housing. Quality design is needed, to ensure that homes are fit for future generations and a more consumer-oriented market.

Pathways that encourage households or communities to build their own homes result in new homes being delivered *in addition* to homes delivered through conventional routes, not in place of them. These pathways could make a meaningful contribution to housing supply. Community-centred initiatives are already happening in Wales. It is crucial that those involved understand the benefits and limitations of alternative approaches.

### **RECOMMENDATIONS:**

- Land should be made available for the delivery of social / affordable housing projects, through a mechanism that encourages exploration of innovative delivery pathways.
- Locally administered registers could assess appetite for self-build and community projects, and connect people that have a better chance of success working together.
- LAs could facilitate such projects by providing serviced plots with 'principles of development' in place. Affordable land removes the two biggest barriers to self-build.
- There are around 23,000 empty properties in Wales. Well placed infrastructure projects could unlock significant quantities of housing without building a single home.
- Powers that enable Local Authorities to tackle derelict or empty infill sites, unoccupied buildings and land-hoarding by investors should be exploited.
- The location of new housing should not only be influenced by short term 'need', but also by resource availability (land, skills, materials) and a wider understanding of sustainable growth (70% of the world's population will live in 'urban' areas by 2050).

## **construction techniques** (full report, section 7.2)

Most housing is built by a small number of nationally operating housebuilders using traditional construction techniques. Disincentives for them to embrace alternative construction techniques include established supply chains and standardised designs. Incentives for smaller 'alternative' operators to up-scale are limited by the quantity of large residential developments in Wales. By expanding, they would expose themselves to greater risk through a lack of consistent demand. Also, the use of alternative forms of construction at a national level would necessitate widespread reskilling and retooling. However, unless these techniques are delivered at scale, their full benefit will not be realised.

Alternative techniques use less cement than 'bricks and mortar'. Many are timber-based, a sustainable resource existing widely in Wales that 'locks' carbon into buildings, improving carbon footprints, and providing opportunities for local resource use and economic benefit.

## Selection of approach:

### Key considerations

#### delivery

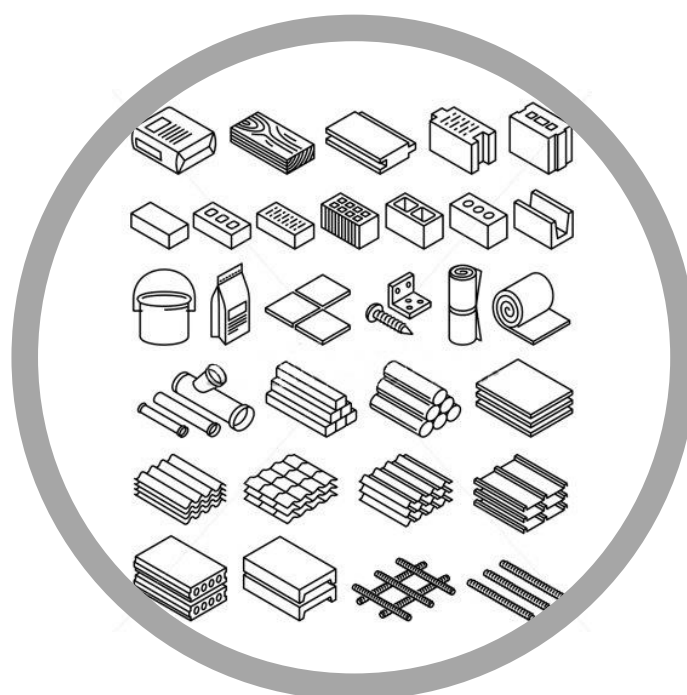
Who is delivering the project?  
How will it be delivered?  
What is the capital budget?  
What are the timescales?  
What relevant expertise exists?

#### in-use

Who is the housing for?  
How will the homes be used?  
How might user needs change?  
How likely is future adaptation?  
What is the long term intention?

#### context

What is the physical context?  
What is the local climate?  
What materials are available?  
What skills are available?  
What resources are needed?



#### delivery

More affordable construction  
Shorter timescale, less defects  
Lower embodied energy  
Less impact, carbon storing  
Improved ecology

#### in-use

Lower primary energy use  
Reduced heating bills  
Reduced CO<sub>2</sub> production  
On site energy capture+storage  
Future source of revenue

#### context

Less pressure on local systems  
Community training / skills  
Revitalising existing community  
Supporting local supply chain  
Contributing to local economy

### Potential benefits

Figure 1: Potential benefits and key considerations affecting choice of approach

Some of the case study techniques (and others, not captured by the study) are emerging, with limited track record, and represent relatively high risk / high cost options at this time.

However, each technique has different potential benefits. Some reduce specialist skills, increasing their applicability. Others lend themselves to densification of existing neighbourhoods. Some alternative approaches support greater levels of flexibility and adaptability, while others can deliver higher quality, even zero-defect, building. Pop-up factories establish opportunities for local training, and promote the use of local materials and resources. Some approaches would put development directly into the hands of communities.

## RECOMMENDATIONS:

Live affordable housing projects should be used to test emerging Welsh Housing Standards, and to identify the benefits and limitations of different construction techniques, by means of:

- performance comparisons (primarily energy and carbon, during delivery and in-use).
- potential for flexibility, adaptability, ease of maintenance and eventual re-use.
- applicability for alternative delivery pathways or skills training.
- use of local resources / products that might be developed into a Welsh supply chain.

Projects should be monitored during construction and post occupation, using an open, interdisciplinary protocol for data collection, reporting and dissemination. Affordability and the wider value of each construction technique should be a focus of monitoring.

## **cost versus value** (full report, section 7.5)

According to BCIS data, the cost of new housing in the UK is among the most expensive in Europe, at around £1050/m<sup>2</sup>. Changes to Building Regulations (Part L1, Wales 2015) have improved performance, but added to cost. Accessibility adds further costs, particularly in locations with challenging topography, as does the recent requirement for sprinklers.

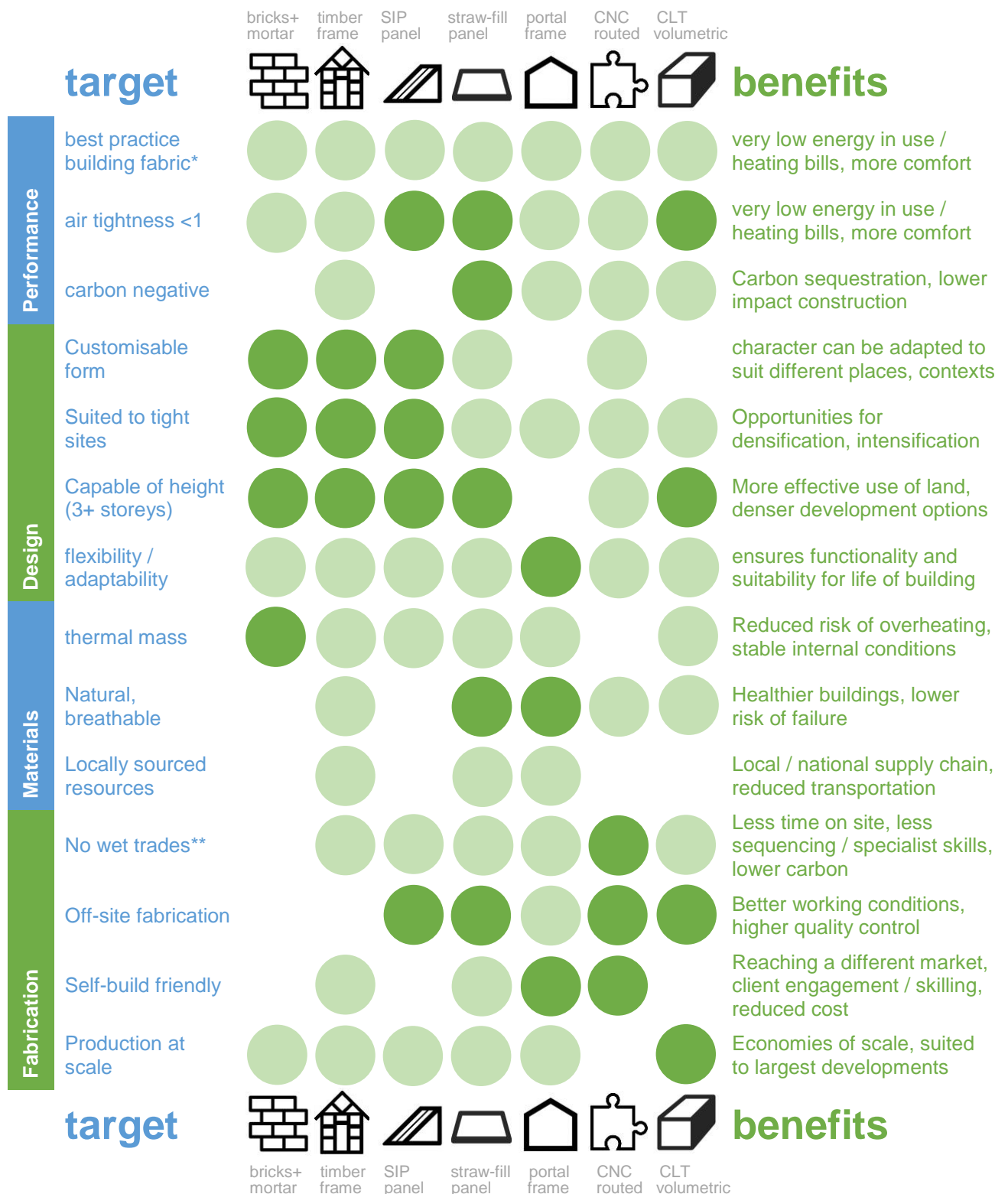
In the drive for better performance in terms of energy efficiency, historical social / affordable housing pilot projects attempting to attain higher standards (for example CfSH level 5/6) have often done so by adding 'bolt-ons' to traditional approaches rather than considering alternatives holistically, which has resulted in untenable cost increases: "...the Code Pilot programme supported the emerging trends and understanding that the cost of delivering zero carbon on site was prohibitive, and could offer serious challenges in both cost and design principles." (BRE, WG Code Pilot Programme Technical Report ref. 285-001, 2013)

For lower income communities in Wales, the prospect of purchasing new housing outright at elevated costs is unrealistic. Alternative approaches are needed, that deliver 'better' affordable housing without untenable cost increases. The financial implications of each are difficult to report without complex, in-depth cost analysis, because impacts are interrelated. All case studies improved performance and reduced (and in some cases offset) heating bills.

Capital costs for case studies are in the range £500/m<sup>2</sup> to £1500/m<sup>2</sup>. At the lowest end, capital costs do not deliver 'finished' buildings, only shells. Self-build construction dominates the lower cost case studies due to savings on labour (25-45% of total cost), but is limited in its applicability. Other approaches propose to deliver better value homes in terms of energy conservation and reduced heating bills, without considerably increasing capital costs.

It is important to distinguish between cost and value. Alternative approaches can deliver better value than traditional approaches, through wider benefits such as reduced pressure on local systems (including environmental systems and healthcare), skills provision, increased local employment, and benefits to the local economy.

# Comparison, seven construction techniques:



\* facility to achieve thermal performance equivalent to Passivhaus standard

\*\* excluding foundations



Potential benefit



Delivered benefit

Figure 2: comparison of 'potential' and 'delivered' benefits, by construction technique

Developing appropriate technologies in Wales would build capacity for local construction. An all-Wales supply chain would keep much of the expenditure within Wales, reinvest capital in Welsh industries and, longer term, and develop expertise and products for export.

Three of the projects generate significant income through renewables (PV). In the right context, renewables provide a means by which housing delivery can be re-considered as an income stream, offsetting rentals to deliver more affordable housing. However, in order to be successful, energy generation must be properly integrated into the projects – in terms of design, construction and operational / maintenance programmes.

## **Initiating a step change** (full report, section 7.6)

To facilitate a step change in the quality and quantity of housing, Welsh Government should:

- Task a working group with understanding housing in the context of the WFGW Act.
- Map existing / emerging housing standards against existing performance standards.
- Liaise internationally with innovative policy makers, commissioners and practitioners.
- Establish an open-access forum for anyone interested in building homes.
- Map housing need, supply and opportunities in a transparent, joined-up way.
- Nurture industry in Wales with potential to contribute to a Wales-based supply chain.
- Explore the densification of existing low density communities in viable locations.
- Translate this learning into a clear, concise, flexible, adaptable housing standard.

A new Welsh Housing Standard should promote quality, diversity, sustainability, shared learning and equality. It should be capable of adapting to emerging best practice and demand excellence in the built environment, to ensure that Wales has a clear pathway to decarbonisation, and a means of developing sustainably for the future.

## **In conclusion**

Wales should lead the way by placing affordable housing and affordable warmth at the centre of national policy, with homes and places that meet our needs, now and in the future. We must stop thinking purely in terms of capital costs. Construction that drains resources should be replaced with buildings that generate resources – that are energy positive and carbon negative. This fundamental perspective shift is in line with the WFGA (Wales) 2015.

By employing alternative approaches, we could be constructing new homes and neighbourhoods in a more contextually appropriate way, with greater long term value.

Alternative approaches have the potential to deliver affordable homes *in parallel* with more established methods, so long as knowledge is shared with commissioners and constructors.

Different delivery pathways and construction techniques could lead to more diverse housing that is better quality, more fit-for-purpose, more affordable and more sustainable.

Further benefits could include the growth of employment in Wales, a national supply chain, greater long term resilience, and renewable energy infrastructure as a source of income.

The creation and maintenance of sustainable communities could provide a new focus for post-industrial Wales, facilitating joined-up development that works at a local level.



# delivery pathways: step change impact

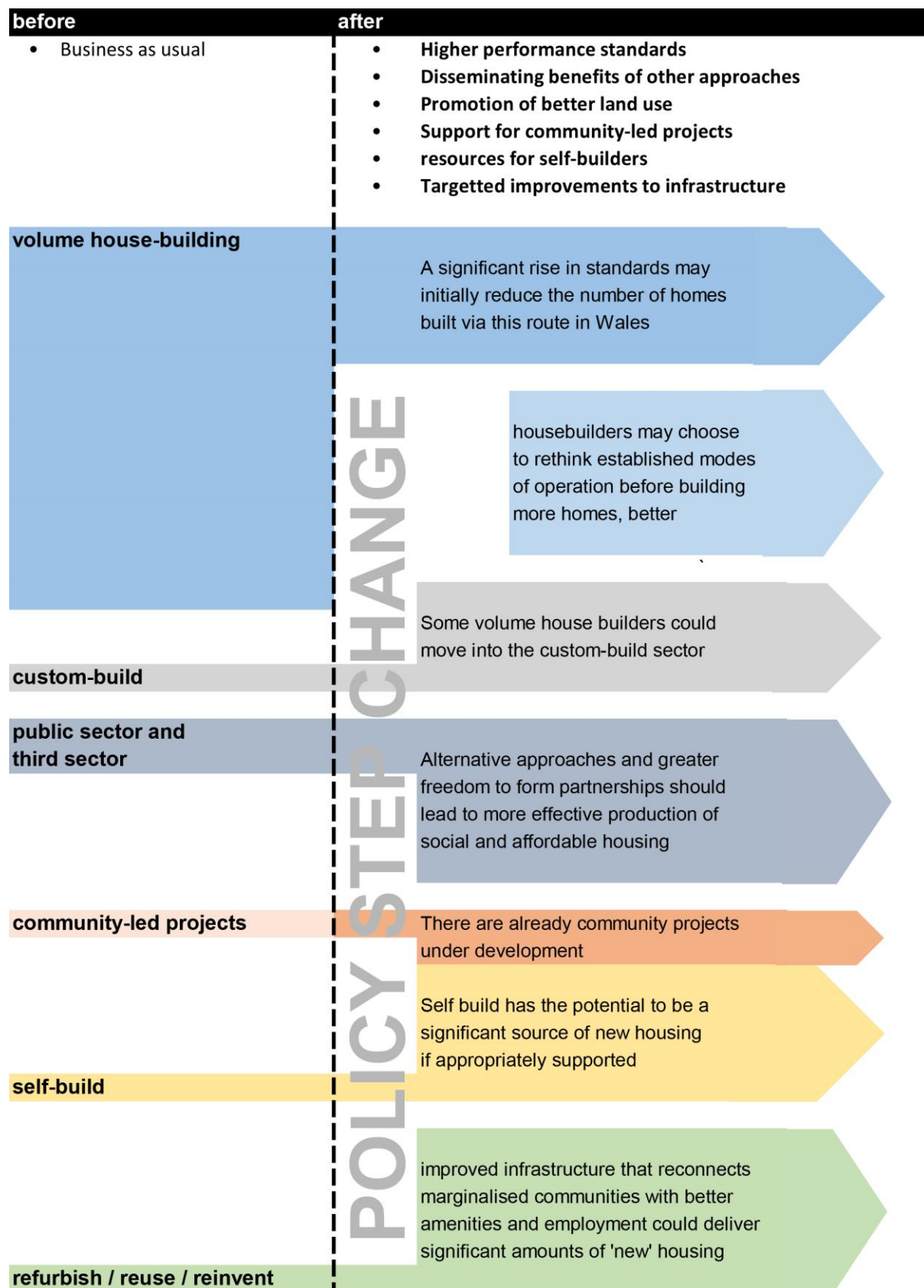


Figure 3: Conceptual impact of a policy-led step change on housing delivery pathways

If Wales is to rise to the challenge of the housing crisis by constructing a legacy of homes that future generations consider to be a blessing and not a burden, the correct standards, incentives and monitoring must be put in place to encourage *all* existing pathways, along with some that do not yet exist, to produce more, better housing.

“We are forced to choose between **three courses of action**:

The first is to build only the **small amount** we’re likely to be able to afford. This is to acknowledge defeat.

The second is to accept a **drastic reduction in space and quality** while maintaining the same total. This again is defeat, and why should we accept defeat in this, when we have accomplished so much in other fields – radar for instance, nuclear fission, or jet propulsion?

The third course is to approach the whole problem of building afresh, with the objective of devising a fundamentally simpler technique, **a technique which will give us greater beauty, comfort and value at a lower cost.**”

RMJM co-founder Stirrat Johnson-Marshall, faced with similarly austere circumstances following the Second World War (speaking on the BBC’s Third Programme in 1950)

# construction techniques: step change impact

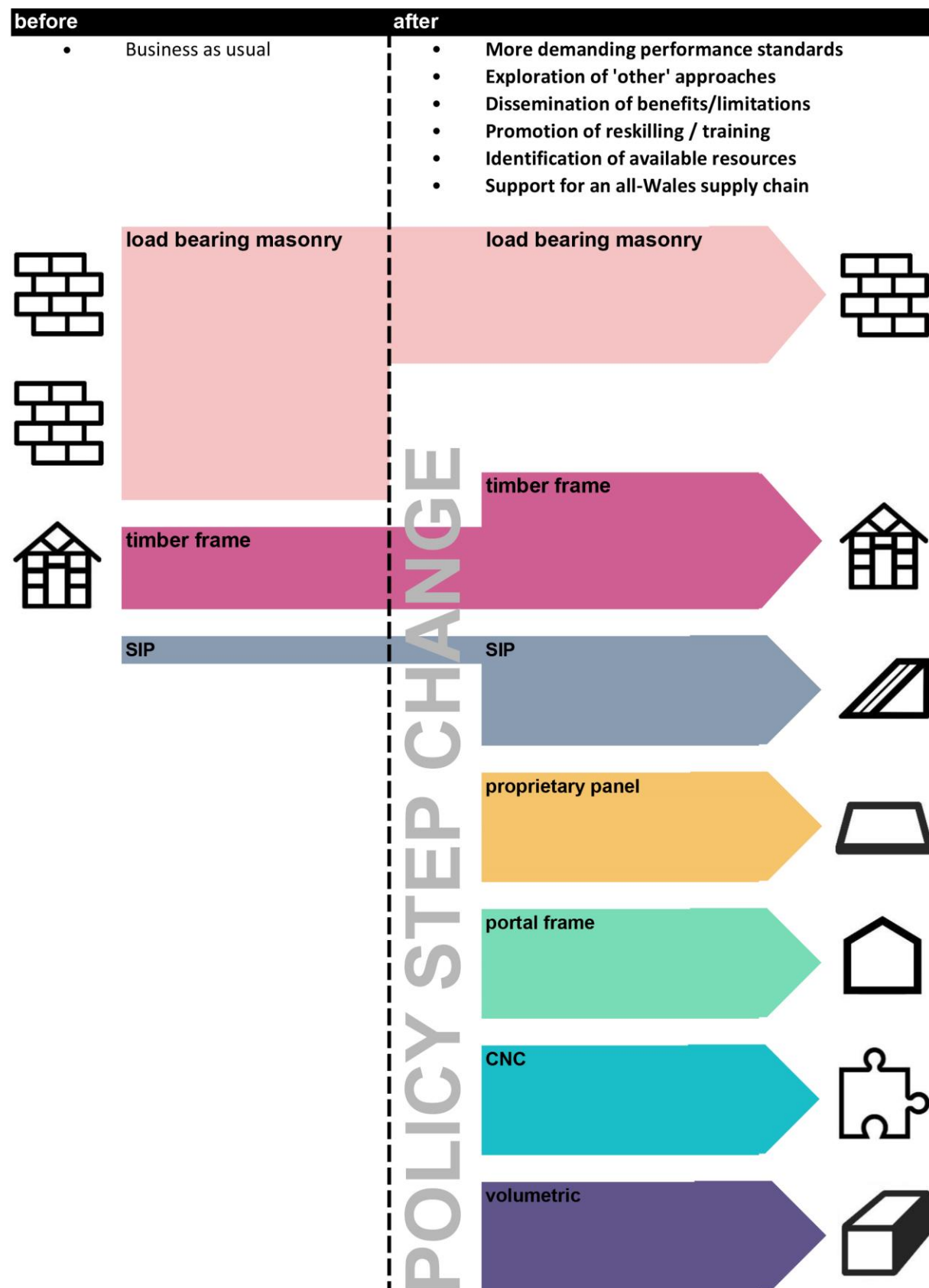


Figure 4: Conceptual impact of a policy-led step change on housing construction techniques

# list of collaborators

This report was funded by Welsh Government's *Homes and Places* division. The views expressed do not represent Welsh Government policy. The report was written collaboratively, with the involvement of a wide range of practitioners, academics and industry advisors. Collaborators are listed in the order in which their contribution appears:

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