



TRANSFORMING HOW WE BUILD HOMES

Work package 8/11: **Commercial and Whole Life Cost Assessment**

April 2022



INTRODUCTION

As part of the Advanced Industrialised Methods for the Construction of Homes (AIMCH) project, AIMCH partners commissioned Whole Life Consultants Ltd to compare the whole life costs (WLC) and life cycle costs (LCC) of four different house types, each built using three methods of construction.

The whole life cost assessment has been carried out in the wider context of AIMCH Work Package 11 (Embodied Carbon and Whole Life Cost Assessment), which among its objectives, aimed to:

- Evaluate the benefits and/or impacts on the long term environmental and commercial/financial impacts of the use of MMC systems in future AIMCH housing and asset management
- Provide data in support of the benefits/impacts on the procurement of housing, considerate of capital cost vs whole life cost, in the context of MMC panelised construction systems compared to conventional build methods, assessing procuring for value vs procuring on cost.

SUMMARY

According to ISO 15686-part 5: 2017, whole life costing (WLC) is “a methodology for systematic economic consideration of all whole-life costs and benefits over a period of analysis as defined in the agreed scope”.

Life cycle cost (LCC) is “the cost of an asset, or its parts throughout its life cycle, while fulfilling the performance requirements”.

Assessment for WP11 was based on the above, and cost items included were:

- **Building elements**
- **Prelims and site overheads**
- **Waste disposal**
- **Life expectancy**
- **Replacement**
- **Decoration and redecoration**
- **Energy consumption and price**
- **Disposal**
- **CO2 emissions (quantity and price)**
- **Financial benefits arising from early completion**

JOURNEY

Whole life cost assessments were carried out on a range of homes and build methods agreed with the AIMCH partners. These were three and four-bedroom semi-detached homes from Barratt Developments PLC and two-bedroom semi-detached and three-bedroom townhouses from L&Q.

Methods of construction used in all house types were:

- Traditional - standard masonry, using aerated concrete blockwork and brick cladding
- Open panel - off-site manufactured open panel timber frame with brick cladding
- Closed panel - off-site manufactured closed panel timber frame with brick cladding

A summary report shows the comparison of the four house types and construction methods to England and Wales Approved Document L Building Standards (published Mar 14). The Full Detailed Whole Life Cost Assessment Report is commercially restricted to AIMCH partners.

Additional modelling will be undertaken in the future to assess the implications on compliance to Jun 22 AD-L building regulation changes and Future Homes Standards in England and Wales.

NOTE: Construction cost data refers to late 2019/ early 2020 prices. Prices of materials have changed significantly since that data was collected.

CONCLUSIONS

The study showed that while timber frame solutions are, on average, 2-8% more expensive than traditional masonry solutions, MMC adoption reduces on-site construction duration. As a result build-to-sell business models may benefit from earlier interest repayment of loans, and build-to-rent business models may benefit from earlier rental income, depending on geographic location.

Timber frame construction methods reduce environmental costs. Open panel and closed panel timber frame cost decreases on average by 0.5% and 0.6% respectively when the cost of CO₂e associated with construction is accounted for.

Although not directly quantifiable due to a lack of data, another benefit of the use of timber frame solutions is the increase in quality improvements associated with making MMC components in a controlled environment.

In terms of carbon, the benefits of timber frame over masonry construction will become increasingly significant, as will focus on reducing the embodied emissions from cementitious products and operational emissions with the implementation of the Future Homes Standard, continued decarbonisation of the UK electricity grid, and increased electrification.

Future Homes Standard will have a significant impact on both traditional and timber frame specifications, consequently impacting the cost margins between the two systems.

Operational costs of traditionally-built houses are similar to those of open/closed panel timber frame houses of the same type. This is principally

because, regardless of the construction method, the houses are all designed to the same energy efficiency standard. Consequently their energy usage, associated emissions, and energy costs are the same.

Geographical location has a significant influence on labour cost, which makes MMC a more viable solution in locations where labour costs are high (e.g. southern regions and London). The cost data used here is from a small sample, therefore further cost analysis would need to be carried out before any business decisions are carried out.

Construction cost data refers to late 2019/ early 2020 prices. Prices of materials have changed significantly since that data was collected. Therefore, it is recommended the models are update with current cost data before any business decisions are made.

Although not directly quantifiable due to the lack of data, another benefit linked to the use of timber frame solution arises from quality improvements associated with the manufacture of MMC components in a controlled environment (i.e. the manufacturing of closed panels versus the on-site erection of walls).



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