

Retrofit of Wimpey No Fines Homes External Insulation to reduce Carbon Emissions

By Paul Davies

1 - Introduction

After the second world war tens of thousands of “Wimpey No Fines Concrete” properties were built quickly and cheaply to cater for the housing shortages between the 1940’s and 1980’s, but with no consideration given to thermal performance, they are now difficult and expensive to heat. With the gradual onset of damp and condensation, these homes will also be leading to internal and external deterioration of the building, potentially causing health issues for residents. With around a third of a building’s heat lost through the walls, insulating them is one of the quickest and most effective ways to improve energy efficiency. As a result, recent years have seen a huge growth in the use of solid wall insulation, particularly following government-funded initiatives as local authorities, housing associations and private customers have turned to the solution as a way of avoiding demolition of aging properties.

2 - Methods

Wimpey No Fines Concrete (WNFC) was one method of construction undertaken and approximately 300,000 properties were built across the UK to rapidly fill the Social Housing shortage over a period of 30 years. A no fines house construction is an in-situ process where panelling is erected and a mix consisting of cement and coarse aggregate between 8 – 10 mm is poured from a height of over 7.5 metres and extending to up to 18 metres long to create the external walls of a building 250mm thick.

Fig. 1 & Fig. 2



Fig. 1 Pre-fab shuttering Fig. 2 250mm External wall

At the time of construction the ‘U’ value ratings for a 250-mm thick NFC wall with two coat wet plaster finish was 1.71 W/m²K a far stretch from current ratings of 0.30W/m²K. With this in mind the Social Housing sector have invested heavily to improve the current housing portfolio and bring them up to current standards by improving energy efficiency thus reducing their Carbon Emissions. To do this external cladding or ‘Enveloping’ of the NFC constructions have been introduced, along with loft insulation 300mm thick to fully insulate the properties.

3 - Results

Fitting External Wall Insulation (EWI) to NFC properties can have a profound effect. Increasing warmth within the property, providing overall increased general health and wellbeing to the home owner. Reducing heating bills by reducing heat loss were by reducing energy consumption reducing the carbon footprint of the property.

Fig. 3

Research by UWE Bristol has shown a typical NFC property fitted with EWI can reduce CO₂ emissions by 40%, reduce energy usage 30%, reduce the property ‘U’ values and improve home quality.

Fig. 4. & Fig. 5

Another research by Leeds Beckett University have found similar results with Wall U-values improving from pre-retrofit 1.23W/m²K to post-retrofit 0.26W/m²K



Fig. 3 External Wall Insulation

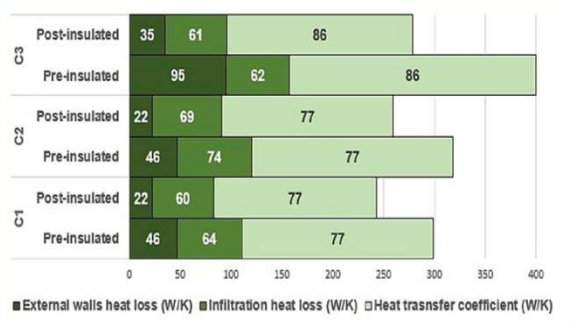


Fig. 4 UWE Bristol study results

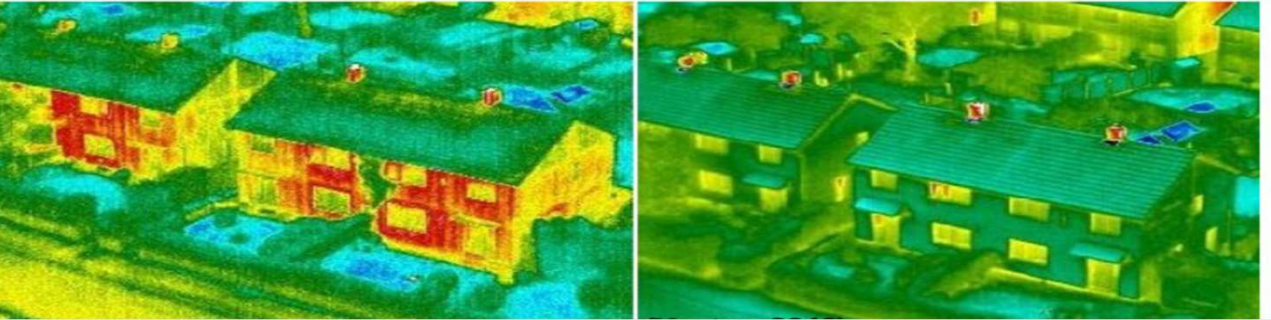


Fig. 5 Thermal Image before and after EWI has been fitted (UWE Bristol Case Study)

4 - Discussion

Research has shown the benefits of using EWI especially with NFC constructed buildings. Although there are issues that would need to be addressed when using this type of insulation the benefits out-weigh the negatives. The thermal insulation can now bring properties up to or close to current Building Regulations. The use of EWI is not a stand alone solution, roof insulation and double glazing will also be a major factor when insulating a NFC property. Other considerations would be ventilation, as the property would now be thermally sealed with insulation and consideration to condensation and cold spots would need to be addressed, the use of mechanical ventilation in bathrooms and kitchens would prevent condensation build up. Therefore the whole house approach should be considered when thinking about EWI. Fig. 6

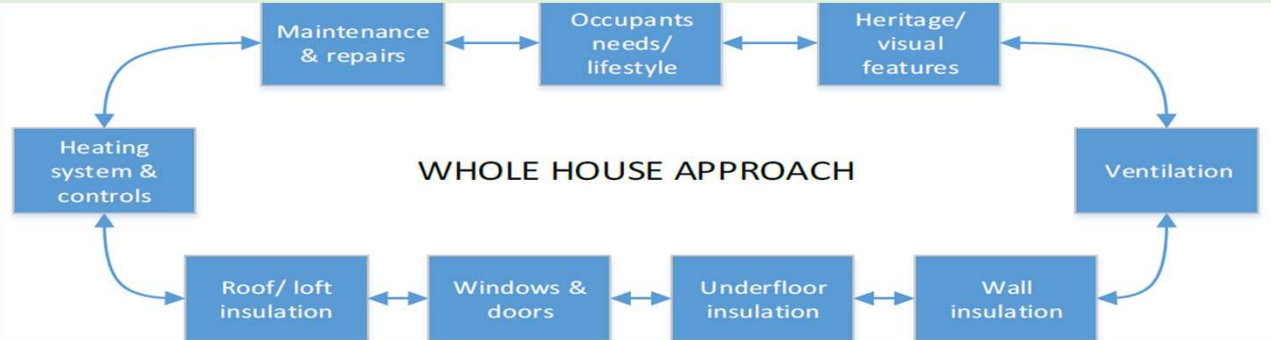


Fig. 6 The Whole House Approach

5 - Conclusion

Since the start of construction in the 1940’s of No Fines Concrete properties, there has been a dramatic shift in the construction industry to conserve energy and reduce our carbon emissions, as it has been illustrated the reduction in the ‘U’ value ratios alone have been significantly reduced therefore our current portfolio of housing will need to be retrofitted or upgraded to meet current standards (PAS-2035) and Building Regulations. This is not a one size fits all solution, what will work for some properties will not work for others. In this case NFC properties can benefit from EWI as long as it is introduced in alignment with fully insulated roofs, windows etc. The benefits to be gained from EWI would be found not just prolonging the life of the property and give a better thermal performance but to the home owner and the environment with reduced CO₂ emissions, reduced energy usage, improved domestic comfort, better acoustic performance of the property and an improved aesthetical appearance as shown in Fig. 7.



Fig. 7 External Wall Insulation before and after

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