Summary of Environmental Research: 1970's House Retrofit

Architect/Home Owner: Scott Batty Architect

Assessment of the environmental performance of the Retrofit was carried out in 4 ways:

- A dynamic (digital) thermal model of the house was built, with versions of the model before and after the Retrofit*[1]
- Energy bills for the house were compared before and after the Retrofit
- Temperature/Humidity sensors were installed in the house after the Retrofit and also in the house next door, which is a more or less an identical version of the original 1970's house, before the Retrofit, with exactly the same orientation, overshadowing, weather conditions etc. The results were compared over a period of 4 weeks*
- The homeowners were asked to provide qualitative comments following the Retrofit with regard to the internal environment and their living patterns. These were compared with comments made before the Retrofit took place.

Summary of findings:

1. Based on dynamic thermal simulations (digital model): The house as retrofitted should save an estimated 60% of Energy Consumption for Space Heating Load (Energy from Gas in this case)*
2. An estimated two thirds of this reduction is attributed to the new additional insulation (roof space, first floor external wall insulation and injected cavity insulation to ground and first floor)*
3. An estimated third of this reduction is attributed to the new windows/glazing (this is due to a combination of the specification of the glazing/window type, and also some increased areas of glazing that may contribute through solar gain- although it is not possible to separate these two factors)*
4. Comparing the energy bills received by the homeowners since the Retrofit, with those from before, there is a reduction in the use of Gas of around 31%. (This is a total for gas use and also includes gas used for water heating and cooking)
5. Based on dynamic thermal simulations (digital model): If the new external wall insulation had been continued down to cover the ground floor then the reduction in Energy Consumption (for Space Heating Load) is negligible and in addition this may have resulted in overheating- i.e. insulating the roof space and the exterior of the first floor only is where the insulation benefits the most*
6. Through the dynamic thermal simulations (digital model) the benefit of the void over the front door as a solar space has only a negligible contribution to the reduction in energy consumption (this space has more of a contribution as a buffer space, a draught lobby to the front door, and a 'lid' on the downstairs WC/lobby)* However, the homeowners believe differently- that the hot air produced passively from this space is beneficial- it washes back through into the first floor. The window onto the space (the original bathroom window of the house) is opened by the owners each morning and closed each evening.
7. Compared with the house next door, the Retrofitted house is warmer, particularly the first floor rooms*
8. The homeowners have confirmed: The heating is on less, The house is much lighter-lights are on less, living patterns have changed- through winter the family closes off the sitting rooms (sliding doors) and congregates by the built-in fire (this also sits below the master bedroom and pre-warms this space).

[1] * Based upon findings from MSc Dissertation Project -MSc Architecture & Environmental Design University of Westminster, Student Negin Esmailzadehhanjani, Tutor Dr. Rosa Schiano-Phan. Full dissertation can be found here https://issuu.com/msc.exhibition2019/docs/negin_esmailzadehhanjani-2column It should be noted that results and findings are specific for this case study and are limited in their academic remit (i.e not a fully funded PHD).