Overton SeLF
Sustainable Living Forum

REPORT OF THERMAL IMAGING IN OVERTON VILLAGE

Method

Basingstoke and Deane Borough council own a pair of Fluke Ti10 hand-held thermal imaging cameras, one of which was borrowed by Overton SeLF. The camera works by converting radiation emitted from the surface of an object into a temperature displayed on a screen. The survey method involved scanning the inside and outside of a property looking at the surface temperature of parts of the building to show heat flow though the building. The aim of the surveys was to help the householders improve the energy efficiency of their house according to the principles detailed in the appendix.

Three rounds of surveys have been completed: November 2011 (14 properties); March 2012 (28 properties) and January 2013 (34 properties), giving a total of 66 properties. The first round was promoted via an evening event in the Community Centre, the two subsequent by notices around the village and in Overton News and Views.

The surveys were mostly performed in the evening, with the heating on in the house with the hope of maximising any temperature difference between the inside and outside of the house. During the first two batches of the survey, the weather was unseasonably warm and the external evening temperature ranged between 9-15°C, the final batch was far more seasonal with external temperatures during the surveys at or below freezing. Most houses were heated internally to at least 20°C.

Surveys took between 45 and 60 minutes to complete, depending upon the size and complexity of the house and the level of interest from the house holder. Large complex houses with keen householders took the longest to complete.

Except where stated the results are summarised across all three studies. Note that the survey properties were not selected at random therefore they may not form a representative cross-section of the Overton housing stock.

Housing Stock in Overton

Overton's housing stock is a mixture of house styles. Most houses are of brick construction with a tile or slate roof. Except for the very core of the village, most of the properties in village have been built in the last 60 years.

The housing stock surveyed ranged in age from pre-Victorian age property through to modern buildings, including both the new Foxdown and Overton Hill developments. Properties were a mix of terrace, semi-detached and detached construction. Single and two storey houses were present, as were some loft converted two storey buildings. There were no flats, maisonettes or multi-storey buildings.

Properties were of all common construction methods: solid, empty cavity and filled cavity walls were examined. Properties had a range of glazing from single to triple glazing. Doors, door frames and windows frames of wood, metal and plastic composite were included. Properties with solid concrete ground floors and suspended floors were surveyed. Most houses had an empty loft but there were some loft conversions and chalet style properties.

Results

Walls

Cavity walls filled with insulation were demonstrably cooler on the outside and warmer on the inside than similar unfilled cavity walls. Solid walls were consistently cold on the inside and warm on the outside – though thicker solid walls performed better than thin solid walls. Radiators mounted on external walls can easily be detected from the outside when the walls are solid. Radiators cannot be detected on external walls if they are of cavity construction (filled or unfilled).

Cavity wall construction appears to be common in Overton from around 1900, considerably earlier than nationally, hence many properties built between 1900-1930 may benefit from cavity wall insulation which would not be expected based on the age of the property alone.

Many houses still had unfilled cavity walls. While some houses would be more technically challenging to fill because of the narrowness of the cavity or the overall construction, filling the cavity of the wall is still one of the most cost effective things that householders can do.

Older properties without cavities can still be insulated. External cladding is very effective but is expensive and may change the appearance of the property and is often only be practical on detached properties. Internal insulation is cheaper but is not as effective and can lead to dampness problems if not carried out properly.

Glazing and Doors

Glazing performed as expected, with triple glazing working best, sealed unit double-glazing second, secondary double glazing third and single glazing performing worst. Modern windows with low-E glass should also outperform older glass but this was not observable. Good fitting timber frames were the most efficient and block out less light than uPVC window frames. Many uPVC window frames were observed to be draughty and poorly fitted. Metal window frames were rare and while lowest in profile (least optical intrusion) were very good conductors and lead to water condensing on the glass closest to them.

In houses with modern double glazing and thin solid walls, the windows usually outperformed the walls, in most other cases the walls outperformed the windows. This was particularly noticeable on the colder days of the surveys.

In all cases curtains and blinds improve the internal facing temperature of the window, this effect was most noticeable the older the window. Except for the most sophisticated windows and doors, most would benefit from the installation of thermal/black-out blinds and thick lined curtains.

In properties with single glazing, upgrading to some form of double-glazing would be recommended but this is often expensive and may require skilled installation to preserver the appearance of the windows. Applying a low-E film to the existing glazing may improve the thermal properties of the windows without the expense of re-glazing.

Doors were variable, the best ones were engineered, made of wood or plastic composite with minimal glazing and were tight fitting. Glazing, panelling, letter boxes and poor fit all drastically reduced the performance of doors. As with windows, a thick curtain behind the door should make a noticeable difference in the performance of the door. Where possible draft proofing would improve the performance of many doors – but needs to be done carefully on plastic doors which are easy to deform.

Very few properties had a vestibule or porch, both which improve the performance of doors.

Roof

All roofs were cooler than walls on the outside and all top storey ceilings were warm in the study. Therefore, in most cases the current level of insulation was visibly working, although more loft insulation often should be added. Considering the free loft insulation given away as part of “Insulate Hampshire” during 2012 many properties still did not have the recommended 30 cm of loft insulation.

A minority of properties had poorly fitting loft insulation with many cold patches – this was most common with truss based roofs and less common with the older joist and rafter style roof. This was even visible in houses that had topped up their insulation recently.

In many houses the loft hatch was either a solid cold slab or had a cold draughty ring around it.

Loft hatches need to be treated like an external door and insulated accordingly. In most cases additional insulation to the loft hatch would benefit the householder.

Many properties in Overton have partially pitched ceiling in the upper storey. In most properties they were clearly empty of insulation. Even relatively modern properties often showed very cold pitched ceilings. While these spaces can and should be insulated it is a dirty process and it is important to maintain adequate ventilation into the loft-space above the insulation.

Lighting

Many properties still had a mixture of older incandescent lamps and more modern compact fluorescent lamps. A small number had halogen lamps instead of incandescent lamps where fluorescent would not be appropriate. A very few had LED lamps installed. In most properties there was an insufficient amount of light switching resulting in a considerable excess of lighting.

Heating

While most properties had new condensing boilers, many still had older boilers, in some cases up to 30 years old. Almost all properties had water filled radiators providing central heating. Most radiators were flitted with thermostatic radiator valves but some still had the older valves in place. Only a tiny number of properties had under-floor heating.

Best House

One property (construction approved 1997) stood out head and shoulders above all others. It had thick cavity-wall insulation, Swedish standard triple glazing, multi-zone under-floor heating, a grey water collection system, managed ventilation and solar thermal heating. It was without doubt the most efficient in the survey.

Feedback

Feedback questionnaires were given to householders after the survey, by email for the first two rounds and physically for the third round. There were 6 responses from the first 42 surveys and 15 from the third batch of 34 surveys. All respondents were happy with the survey process and would recommend a survey to a friend. Most respondents indicated that they had or were going to act on the advice given and expect to see some savings.

Conclusion

The most striking observation is that while older properties are cold and expensive to heat they are often not as poor as people think and a lot can and in some cases has been done to improve them. Modern properties are clearly warmer and sometimes cheaper to heat but they are not as good as they could be – especially when compared to our neighbours in Europe.

Appendix

In a typical British home about 75% of the total energy is used in space heating. In most British houses space heating is via a gas fired boiler and water filled radiators.

In a typical twentieth century house of standard construction techniques and materials, heat escapes via the walls (35%), the roof (25%), draughts (15%), the floor (15%) and finally the windows (10%). The actual amount escaping through the various parts of the house will vary but these are a good approximation.

The most cost effective way to save energy is to tackle energy losses via the largest sinks first. Installing cavity-wall insulation and 300 mm of correctly installed loft insulation will make the greatest impact on heat loss as walls and roofs account for 60% of an average British house's energy loss. Draughts may only represent a small energy loss but draught proofing it is one of the cheapest and most cost effective things that can be done. Taken together these measures should reduce the bulk of the heat loss in most buildings without significant cost or disruption.

Suspended floors when being worked upon can be cheaply insulated but in most cases this is not practical. Solid concrete floors can have insulation added but this is neither cheap nor easy unless work is already being undertaken. Most people find that a good quality insulating carpet underlay is the best that they are able to do on their floors.

While high performance double or triple glazing is attractive, it is in almost all cases not cost effective to replace existing glazing with new and will probably never lead to a return on investment. In almost all cases, fitting thermal blinds and lined curtains and using them is the most cost effective way of insulating windows.

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