

# On-Ground Assessment of the Energy Efficiency Potential of Victorian Homes

*A study by the Moreland Energy Foundation for Sustainability Victoria, May 2010*

## SUMMARY

Given that 96 percent of houses in Victoria were built before the introduction of five-star energy efficiency standards, improving the environmental performance of older homes is essential to reducing the state's energy use.

A new study conducted by MEFL for Sustainability Victoria has given us a better understanding of just how inefficient Melbourne's older houses are, what needs to be done to improve them, and how much it might cost.

### Measuring the energy efficiency of older homes

Fifteen houses built between 1900 and 1980, located mainly in Melbourne's inner north, were chosen for the pilot project funded by Sustainability Victoria. The houses chosen were mainly free-standing weatherboard or brick-veneer homes, and ranged in size from 75 m<sup>2</sup> up to 175 m<sup>2</sup>, much smaller than the average new home built today.

Each house was measured and assessed in great detail to record the floor plan, building materials, insulation levels, construction characteristics and orientation. Then, a large fan was used to blow air through the, equivalent to a 35 kilometre per hour wind, house (called a 'fan pressurisation test') while specialised equipment monitored how quickly air leaked through all the gaps and cracks.

Then, all the construction and design details were entered into the 'First Rate5' thermal modelling software program to determine each home's star rating according to the National House Energy Rating Scheme (NatHERS).

The average energy rating of the fifteen houses was just 1.3 stars, and four of the houses rated less than one star. Only two houses had a star rating of above two. This indicates that we've got a long way to go to bring the majority of older homes up to today's energy-efficiency standards. It also means that people living in older houses are likely to be paying more to heat and cool their homes.

### Energy hungry appliances

During the survey of the house, the researchers also noted the type and number of major appliances being used. This included checking the energy-consumption of water heaters, fridges, heating systems, air-conditioners, dishwashers, clothes washers, lighting and televisions. The study examined the cost of upgrading major appliances, and calculated how long it would take for the householder to get their money back through savings on energy bills.

---

Upgrading to a gas-boosted solar hot water system, installing a high efficiency central-heating system, and replacing low-voltage halogen down lights proved to be the most beneficial actions. In most cases the energy savings achieved through upgrading fridges, air-conditioners, televisions, dishwashers, clothes washers and televisions were not significant enough for the upgrade economically viable.

The findings highlight the importance of ensuring that high efficiency appliances are chosen when appliances reach the end of their operating life, since at this point the cost difference is much less.

### **What's the best solution for older buildings?**

The research also evaluated the potential benefit that could be gained from a range of common home-improvements. Rather than actually installing the upgrades, FirstRate5 software was used to model hypothetical changes to each house, and estimate what impact they would have on the home's energy efficiency and star-rating. Two sets of actions were investigated.

Basic upgrade:

- Ceiling insulation – either top-ups or installation of new insulation;
- Comprehensive draught sealing consisting of sealing wall vents, skirting boards, recessed downlights, exhaust fans, doors and windows;
- Underfloor insulation in the case of houses with suspended timber floors;

Advanced upgrade, all of the above plus:

- Drapes and pelmet on windows to reduce heat loss;
- External awnings or blinds on unshaded windows facing north, east and west;
- Wall insulation pumped into the external wall cavity;
- Double glazed windows to replace existing single glazed windows.

The cost of each retrofit measure was calculated to compare which actions were most cost-effective.

### **Results of the study**

The results of the modelling show that wall insulation had a significant impact, increasing the house energy rating by over 1.5 stars. Simple draught sealing also performed strongly, increasing the rating on average by almost half a star.

The basic upgrade package resulted in an average improvement of 1 star for a cost of just \$1837.

The full upgrade package was much more expensive, coming in at an average \$22,591, but resulted in an average 3 star improvement.

Applying the advanced package of upgrades increased the average energy rating of the fifteen homes from 1.3 to 4.3 stars, close to today's legal minimum of five stars.

---

Double glazing was by far the most expensive measure modelled (accounting for 59% of the cost) but delivered less than 10% of the improvement in energy performance. The reverse was true for insulation and draught sealing which delivered 84% of the benefit for only 20% of the cost. It should be pointed out the upgrades were modelled in a particular order (i.e. insulation was applied to the houses before double glazing) and the star rating improvements would vary depending on the order in which they were applied. As a pilot study, the results need to be treated with some caution, but so far the indications are that basic and affordable actions such as insulation and draught sealing may be the best option for making older homes more climate-friendly.

### **Next steps**

MEFL has already commenced second follow up study which will assess a further 30 homes to expand the sample size. Stage two of the research is due to be completed by the end of 2010.

---