

Housing condition/energy performance of rental properties in Victoria

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Prepared for the Department of Sustainability
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Energy Consult Pty Ltd



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Background

The Department of Sustainability and Environment (DSE) are exploring a range of opportunities to improve the energy and water performance of existing homes in Victoria. There is an assumption that private rental properties are typically low energy performers, as there are few incentives or requirements for landlords or tenants to make energy efficiency improvements.

In 2006, 21 per cent of Victoria's housing and apartment stock was classed as private rental accommodation. Additionally, 4 per cent of Victorians live in public housing. The majority (63 per cent) of private rental market dwellings are single and semi-detached/row/terrace houses and townhouses (Class 1 buildings), the remaining 37 per cent are flats or apartments (Class 2 buildings).

According to Australian Bureau of Statistics (ABS) data, 9.2 per cent of Victorian dwellings do not contain building insulation and a further 18.5 per cent of households do not know if insulation is present. One of the reasons stated by occupants for not installing insulation is that they did not own the property (31.7 per cent of respondents).

The predominance of Class 1 buildings in the private rental market offers greenhouse savings potential because some retrofitting options, such as insulation, hot water systems and heating systems are easier for Class 1 than Class 2 dwellings.

This information suggests that a range of low cost energy and water efficiency retrofits could offer significant benefits to tenants, but there is a lack of information defining the extent of the need for such retrofits.

Deliverables of project

While there is data available on housing type (i.e. Class 1 and Class 2) in the rental sector there is very little data on the actual quality and condition of rental housing stock.

EnergyConsult, in a consortium with Moreland Energy Foundation Limited (MEFL) and the Tenants Union of Victoria, were commissioned by DSE to undertake this research.

The project collected data from a sample of both public and private rental properties in Victoria and provides information that fills this qualitative data gap in the rental market.

Specifically, the project provides data on the following for Victorian rental dwellings:

- » quality and efficiency of fixed appliances
- » thermal performance (or indication of) of rental properties
- » building fabric/type
- » age of property.

Project methodology

The project was completed in three stages:

1. Analyse existing data and report the results in a preliminary report.
2. Conduct a series of home audits to address data gaps.
3. Analyse and report the audit results, with comparisons to existing data.

Existing data and preliminary report

The analysis of existing data and preparation of the preliminary report were the first project tasks, with the goal to research information, conduct analysis and report findings regarding rental properties, based on existing rental properties data. The main focus was on private rental properties, but some information was sourced on owner-occupied properties and publicly owned rental properties, for comparison to the private rental properties.

The tasks conducted for the preliminary report were:

- » Obtain energy audit and housing condition data from the relevant agencies and sources.
- » Analyse the data and obtain findings concerning:
 - ownership status
 - quality and efficiency of fixed appliances
 - quality and efficiency of non-fixed appliances
 - thermal performance (or indication of) of rental properties
 - building fabric/type
 - age of property.
- » Address Class 1 and 2 dwellings (if possible).
- » Identify gaps in the existing data, such as geographic areas lacking data, building types under-represented in the data, or aspects of the data where insufficient information on the condition of appliances or buildings has been gathered.
- » Develop a plan for Stage 2 of the project to address these data gaps as much as possible.
- » Develop a market analysis, and possibly case studies, of the Victorian rental property market, including information on owner types, housing types and condition issues (prepared by the Tenants Union of Victoria).

Home audits

The second stage of the project involved recruiting 60 rental households to be audited, conducting the audits and inputting the audit results into a database.

With the relatively small sample of 60 households, it was not possible to get a statistically representative sample of rental homes, however the goal was to attempt to obtain a reasonable cross-section of homes, particularly in terms of:

- » age of dwellings
- » rental prices
- » metropolitan and regional housing.

To meet this goal, the selected homes were:

- » 10 existing audits from Mildura
- » 40 new audits in Moreland, which covered inner to middle suburbs
- » 10 new audits in the outer northern suburbs growth corridor.

The timing of the project required a recruitment approach that took advantage of existing recruitment channels and relationships. The following approaches were used:

- » **Green Towns list.** Existing community assessor/translators identified renters, organised the audit and translated.
- » **MEFL members and community list.** Information was included in the MEFL Bulletin.
- » **Council workers from Moreland and Hume.** A request was emailed to all staff, to identify renters who live in Moreland or Hume.
- » **DSE employees.** A request was emailed to all staff to identify renters who live in Moreland, Hume or the CBD in Class 2 rental properties.
- » **Sydney Road Festival.** Information was distributed as part of a general promotion to Moreland residents to identify potential householders to participate in the Moreland Solar City project.

To facilitate recruitment, an incentive of \$30 per household was offered.

Once the households were recruited, the majority of audits were conducted by MEFL, with twenty conducted by the community organisation Kildonan Uniting Care. Kildonan works in partnership with various energy companies to assist consumers to better understand their energy usage and are experienced in undertaking household energy efficiency audits. All audits were conducted by experienced auditors using standardised audit surveys. The audits were conducted in March 2009, except the Mildura audits, which were conducted by Kildonan in 2008 and 2009.

The audits covered the following issues regarding the energy efficiency and condition of the houses (see Appendix A: Audit Surveys, page 65):

- » type, age and orientation of dwelling
- » ceiling insulation – presence and quality (if possible)
- » draughts
- » major appliances – type, age, condition and efficiency (if possible)
- » windows – leaks, curtains, pelmets and double glazing
- » retrofitting options and barriers
- » existing energy savings measures.

An Excel workbook was prepared for the audit data.

Analysis and final report

The audit data was analysed using the audit worksheets. The analysis primarily consisted of creating descriptive statistics concerning the nature and condition of each house or household and its main appliances, with some cross tab analysis to examine the interaction of factors concerning other aspects of its energy efficiency. However, the examination of this interaction was restricted as analysis of such small sample numbers is of limited value.

The results of the analysis of the audits, and relevant comparisons of the findings with existing data, are reported in this document.



The following market analysis was provided by the Tenants Union of Victoria and provides some context for understanding the findings regarding the energy efficiency and performance of Victorian rental housing.

Private rental market context

There are about 370,000 households living in the private rental market in Victoria.¹ That is about 21 per cent of all households.² Historically, the Australian housing system has been based on majority home ownership, long-term public rental housing for low income households, and transitional private rental. While the proportion of home owners has remained stable for the 1996-2006 period, the private rental tenure share has increased from 20.5 to 21.7 per cent and social housing has declined from 5.6 to 5.1 per cent of occupied housing stock.³ The change in relative tenure share is also evidenced by declining home ownership rates for younger households, which have declined significantly over a generation. Home ownership fell from 65 per cent in 1981 to 57 per cent in 2006 for people aged 25 to 39, with the 25 to 34 age group falling from 61 per cent to just over 50 per cent.⁴

Who is housed in the private rental market?

Table 1 shows the proportion of various household types in the private rental market compared to the household population overall. The data indicates that single person rental households are the most prevalent. It also indicates that group households, which are traditionally associated with the private rental market, make up a relatively small proportion of overall private renter households.

Table 1: Household composition for rental households

Household type	Percentage of households
Single	33.14%
Single + Child(ren)	18.72%
Couple	18.70%
Couple + Child(ren)	19.74%
Group	10.85%

Source: Australian Bureau of Statistics (2006) Census

There are significant numbers of low income households in the private rental market in Australia, with 356,000 households earning less than \$514 per week.⁵ In 2005-2006, there were 439,000 households in housing stress in the private rental market, representing 60 per cent of all lower income private renters and 23 per cent of all private renter households. This compares with 280,000 (or 48 per cent) of lower income home buyers in housing stress. By 2045, almost two-thirds of lower income private renters are projected to be in housing stress.⁶

There is a strong correlation between areas with proportionately high private rental housing and proportionately low SEIFA (Socio Economic Index for Areas) indicators.⁷

About 77 per cent of rental households are located in metropolitan Melbourne, compared to 72 per cent of households overall.⁸

Who are the investors in private rental housing?

Unlike many other countries, Australia has no large-scale institutional investment in residential property, either through the social housing sector (which accounts for less than 4 per cent of housing overall) or through private institutions. Investors are small scale ('mum and dad investors') who generally have portfolios with one to three properties in a suburb close to their own residence.⁹

1 Australian Bureau of Statistics (2006) Census.
 2 Australian Bureau of Statistics (2006) Census.
 3 Commonwealth of Australia (2009) 'National Housing Supply Council State of Supply Report', p. 37.
 4 Yates, J et al (2008) 'Sustaining fair shares: the Australian housing system and intergenerational sustainability', Australian Housing and Urban Research Institute

5 Wulff, M et al (forthcoming) Australia's private rental market: changes (2001-2006) in the supply of and demand for low rent dwellings, Australian Housing and Urban Research Institute.
 6 Yates, J et al (2008) Sustaining fair shares: the Australian housing system and intergenerational sustainability, Australian Housing and Urban Research Institute.
 7 Australian Bureau of Statistics (2006) 2033.0.55.001 – Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia. Note – Socio Economic Index for Areas is a measure of social and economic disadvantage published by the ABS. A lower index indicates higher socio-economic disadvantage.
 8 Australian Bureau of Statistics (2006) Census.
 9 Berry, M (2000) Investment in Rental Housing in Australia: Small Landlords and Institutional Investment, *Housing Studies* Vol. 15, No. 5.

Figure 1: Profile of renters in Australia

Profile of renters in Australia

Over 1.7 million households in 2005–06 rented from private landlords.

Renters comprised 29 per cent of all households in 2005–06, compared with 27 per cent of households in 1995–96.

Renters tend to be a younger group than owner–occupier households. In 2005–06, the median age for renters (based on the age of the household reference person) was 37 years, which was 15 years younger than the median age for owner–occupier households (52 years).

In 2006, renters were three times more likely than owner–occupiers to have changed address within the previous 12 months. At the 2006 census, 35 per cent of people who were renting had lived at a different address within the last year, compared with only 10 per cent of owner–occupiers.

In 2005–06, 32 per cent of all renter households were classified as low income households, and around three-quarters (74 per cent) of these low income renters were renting from a private landlord.

There were an average of 944,000 individuals and families receiving Commonwealth Rent Assistance during 2007–08.

Source: Commonwealth of Australia (2009) 'National Housing Supply Council State of Supply Report', p. 90.

Most investors in private rental housing cite long term capital gain as their primary reason for investment.¹⁰ Only 15 per cent of investors are reliant on rental returns as their primary source of income.¹¹

About two-thirds of private rental housing is managed by real estate agents and about one-third is directly managed by private landlords.¹² Property managers are required to be licensed or to be supervised by a licensed principal and to comply with the requirements of the Estate Agents Act 1980¹³, including a number of regulations regarding professional conduct.

Current rental market conditions

The current Victorian rental market is typified by historically low vacancy rates and significant annual median rent movements. Key drivers include increasing costs and a substantial supply gap. An overall growth in stock has masked a contraction in the proportion of private rental properties that would be considered affordable for low income households.

The generally acknowledged equilibrium point in the market is a vacancy rate of 3 per cent of total stock. In Melbourne, the latest data reveals a vacancy rate of 1.1 per cent.¹⁴ Industry data for January 2009 indicates vacancy rates below 1 per cent both in Melbourne's inner city and outer suburban areas, as well as for some regional markets, such as Bendigo.¹⁵

Figure 2 shows the increase in the overall median rent for all dwelling types for Melbourne for the period 1995 to 2007. Adjusted for inflation, median weekly rent in Melbourne shows more volatility over the period than all capital cities combined (e.g. there was a sharp rise in 1998 to 1999 when median rents reached today's price level) but over the whole period Melbourne rents follow an overall upward trend. Median real weekly rent across all Australian capital cities has risen from \$164 in the March quarter 1995 to \$214 in the December quarter 2007, which is a rise of 30 per cent. This is significant because it means that the cost of rental housing has increased by 30 per cent more than the general cost of living. In Melbourne, median real weekly rent has risen from \$150 to \$196 in the same period, or 31 per cent in real terms.¹⁶

Research commissioned by the Tenants Union of Victoria indicates that the long term trend is for rents to follow property values, so there may still be some rebalancing to property values that were inflated during the most recent boom.¹⁷ This movement is being exacerbated by long standing supply problems.

10 Beer A (1999) *Housing Investment and the Private Rental Sector in Australia*, Urban Studies, Vol 36 No 2, pp. 255-269 and Seelig, T et al (2009) *Understanding what motivates households to become and remain investors in the private rental market*, AHURI.

11 Australian Bureau of Statistics *Rental Investors Survey Australia 1998*, cited by Seelig et al (2006) *Motivations of investors in the private rental market*, Positioning Paper, AHURI.

12 Australian Bureau of Statistics (2006) *Census*.

13 *Estate Agents Act 1980* (Vic).

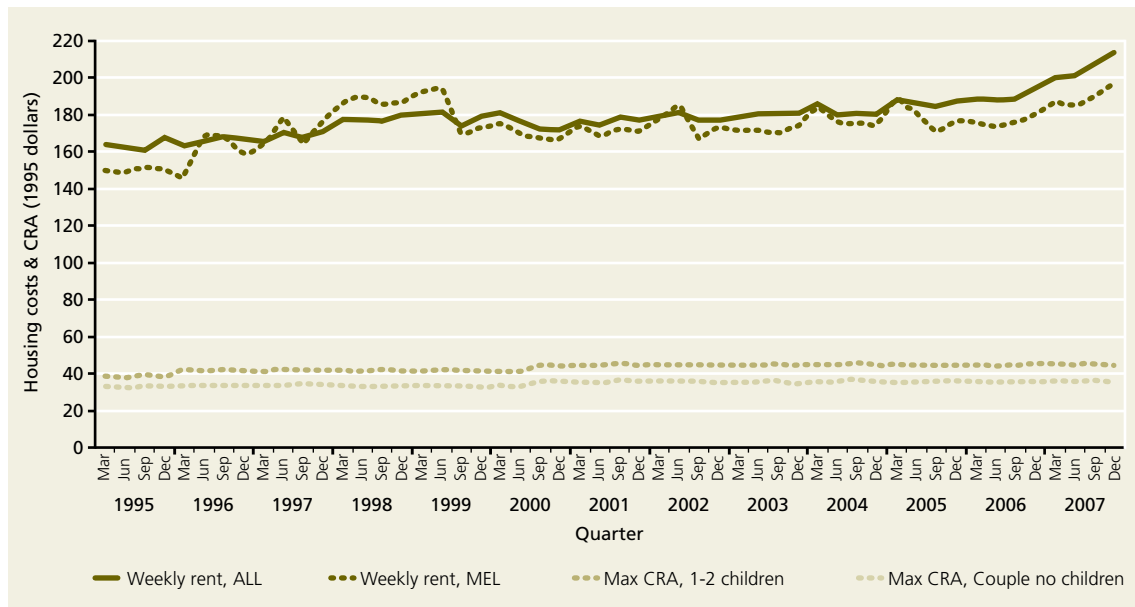
14 Office of Housing Victoria (2009) *Rental Report December Quarter, 2008*.

15 Real Estate Institute of Victoria (2009) *Vacancy Rate data 11 April 2009*, www.reiv.com.au accessed 15 April 2009.

16 'Commonwealth Rent Assistance in the context of rising housing costs since 1995' (2008) prepared for the Tenants Union of Victoria by the AHURI/NATSEM Research Centre RMIT University.

17 'Commonwealth Rent Assistance in the context of rising housing costs since 1995' (2008) prepared for the Tenants Union of Victoria by the AHURI/NATSEM Research Centre RMIT University.

Figure 2: Median weekly rent in Melbourne and all Australian capital cities and maximum rates of Commonwealth Rent Assistance, 1995-2007 (1995 prices)



Source: 'Commonwealth Rent Assistance in the context of rising housing costs since 1995' (2008) prepared for the Tenants Union of Victoria by the AHURI/NATSEM Research Centre RMIT University

The National Housing Supply Council's conservative estimate of the minimum demand-supply gap at June 2008 is 85,000 dwellings¹⁸. The overall gap is projected to grow to 203,000 dwellings. Based on Victoria having a minimum 25 per cent share, the 2008 current demand-supply gap sits at 17,000 dwellings, increasing to 50,750 in five years. Yates¹⁹ estimated similar shortages of affordable private rental in Victoria in the early 2000s. Recently released data indicates that less than 3 per cent of new lettings were affordable for a single person on a statutory income.²⁰

Anecdotal evidence suggests that the shortage of affordable rental housing has resulted in substandard dwellings entering the market and a growth in marginal forms of housing tenure, such as informal rooming houses and long stay caravan parks. This issue needs to be confirmed through further research and investigation of the energy performance and condition of such housing.

The characteristics of rental dwellings and maintenance

There is very little current data available on the characteristics of private rental housing. This is a significant shortcoming in housing research. However, data available on investor expenditure in the early 1990s indicates that 65 per cent of landlords spend less than \$1000 per annum on maintenance.²¹ Low expenditure on maintenance can be expected to negatively affect the energy efficiency and performance of rental housing in the longer term.

18 'Commonwealth Rent Assistance in the context of rising housing costs since 1995' (2008) prepared for the Tenants Union of Victoria by the AHURI/NATSEM Research Centre RMIT University.

19 Yates, J et al (2008) Sustaining fair shares: the Australian housing system and intergenerational sustainability, Australian Housing and Urban Research Institute.

20 Office of Housing Victoria (2009) *Rental Report December Quarter, 2008*

21 Australian Bureau of Statistics Rental Investors Survey Australia 1998, cited by Seelig et al (2006) Motivations of investors in the private rental market, Positioning Paper, AHURI.

The legal context

All residential tenancies are governed by the provisions of the Residential Tenancies Act 1997, except those agreements specifically exempted.²² The Residential Tenancies Act provides a comprehensive scheme that prescribes the rights and responsibilities of residential tenants, landlords, rooming house residents, rooming house owners/managers, caravan park residents and caravan park owners/managers. The Residential Tenancies Act also outlines procedures for the notification and resolution of disputes, including the process for termination and eviction.

The law regarding rental housing standards is complex. The construction and thermal efficiency standards of new rental housing are governed by the Victorian Building Regulations and the Australian Building Code. Since 1 July 2005 that has included the requirement to meet the 5 Star energy efficiency standard. Houses built since this date, which are used for rental purposes, should exhibit good thermal performance. These standards, however, do not cover all household energy efficiency issues, including installed appliances and lighting and fittings (e.g. window treatments). For existing rental dwellings there are no regulatory requirements relevant to energy efficiency and minimal requirements for water efficiency.

Research conducted on behalf of the Victorian Government by Ernst and Young²³ indicates that there are no legal requirements for a number of basic dwelling standards, such as heating and the provision of hot running water. Housing (Standards of Habitation) regulations that governed the standard of all housing, including private rental dwellings, lapsed in the late 1990s, as it was considered that these standards were replicated in other pieces of legislation such as Victoria's Housing Act 1983 and Building Regulations 2006. For example, in regard to fire safety and the provision of smoke alarms there are legal requirements that govern both new and existing dwellings, based on the dwelling classification under the building regulations.²⁴

Section 69 of the Residential Tenancies Act includes important provisions that require the landlord to replace defunct water appliances with water efficient appliances when replacement is required. However, these provisions are only operative for replacement of appliances and not for their repair.

The Residential Tenancies Act also limits the extent to which a tenant can make alterations or modifications to the dwelling. In short, the tenant is unable to make any alteration to the rented dwelling without the consent of the landlord and any such alteration must be removed or reinstated at the end of the tenancy agreement.²⁵ This provision applies whether the alteration is to improve health, safety, access or energy efficiency.

The 'split incentive'

The principal difficulty for the voluntary remediation of energy efficiency in rental dwellings is the split incentive. The split incentive arises because the landlord, who is responsible for maintenance and upgrade of the premises and fixed appliances, outlays the cost of improvements but does not perceive any benefit. Instead, the benefit of improvements passes to the tenant in the form of reduced consumption expenses.

Given the limitations of income, the requirement for the landlord's consent and the problem of restoration, and the varying length and uncertainty of tenure, most tenants are unlikely to voluntarily upgrade their rented premises. That does not prevent tenants from making behavioural changes to reduce their energy usage, but the results of those changes may be limited by the underlying efficiency of the dwelling.

Summary: market analysis and energy performance

Rental households make up about 25 per cent of Victorian households (21 per cent private rental plus 4 per cent public rental). The rental properties are predominantly owned by small scale investors with two or three properties. The current market has historically low vacancy rates and significant annual median rent increases.

There is little information available on the characteristics and condition of rental properties. There are minimal regulatory requirements to maintain or improve the energy efficiency/performance of existing rental housing. There is also minimal incentive for landlords to improve the energy efficiency of rental housing, as the landlord must pay for such improvements, but the tenants gain the benefits of increased comfort and/or lower energy costs.

22 *Residential Tenancies Act 1997* (Vic).

23 Ernst and Young (2007) *Minimum Amenity Standards in Private Rental Accommodation*, prepared for Department of Human Services.

24 *Building Regulations* (Vic) 2006

25 *Residential Tenancies Act 1997* (Vic) s.69

Existing data and preliminary report

Existing data sources and analysis of housing performance

Existing data sources were researched and obtained where possible. The three main types of existing data include:

- » Australian Bureau of Statistics 2008 Environmental Issues: Energy Use and Conservation. These surveys provide an overview of housing market statistics and some information on issues affecting energy performance, such as the presence of insulation.
- » Householder self-report condition surveys. The Victorian Utility Consumption Household Survey 2007 (Utility Consumption survey) was such a survey and consisted of detailed face-to-face surveys conducted with over 2000 householders across the state and attempted to be representative over geographic area, income, age etc. The report on this survey and the underlying database was obtained. Results were drawn for the final report and from re-analysing the underlying data.
- » House condition or audit data. The data obtained was the Energy and Water Task Force 2008 data. In addition, the MEFL: Take Action and Home Energy Audit data was analysed as it contained a small number of rental houses.

The results from these different sources are reported separately and the main findings reported in the summary.

ABS census and survey data

Ownership and dwelling type

The 2008 ABS Census data regarding households reveals that the rental market forms a significant proportion of the overall Victorian housing market, with 23 per cent of all dwellings being rented. This is a slight drop from the 2006 ABS figures noted previously. Rental housing consists of private rentals and public/government rentals, while owner occupied consists of dwellings owned outright by their occupiers and those owners paying off their home. The breakdown of the ownership of the housing market is as follows:

- » owning or purchasing – 68.2 per cent
- » rental, private – 19.3 per cent
- » rental, public – 3.8 per cent
- » other – 8.7 per cent.

The market was then examined for the relationship between housing type and ownership, as reported in Table 2.

The results show the vast majority of owner occupied homes are separate houses, which is a much higher proportion than for rental homes. About half of rental dwellings are separate dwellings and about one third are flats, units or apartments.

Dwelling characteristics

The ABS periodically conducts environmental surveys that include questions regarding construction materials, insulation and heating types. The Environmental Issues: Energy Use and Conservation, March 2008²⁶ survey data was examined as the survey contained data on construction materials, presence of insulation, types of heating, cooling systems and hot water systems. The relevant features of this data are discussed throughout the following section. Note that small discrepancies in the summation and aggregation of ABS statistics may occur through rounding errors.

26 Australian Bureau of Statistics (2008) 4602.0.55.001 – Environmental Issues: Energy Use and Conservation, March 2008

Table 2: ABS – Dwelling type by ownership

Ownership status	Separate house	Semi-detached/ townhouse	Flat/unit/ apartment	Other/don't know
Own/purchasing	87%	7%	6%	
Rental, private	49%	16%	34%	1%
Rental, public	47%	14%	35%	4%
All households	76%	9%	14 %	1%

NOTE: Figures are rounded to the nearest whole number.

Construction materials

Table 3: ABS – Construction materials by ownership type

	Brick veneer	Double brick/cavity brick	Weather-board/timber	Fibro-cement	Concrete/besser block	Other material/can't say
Own/Purchasing	62%	12%	17%	4%	3%	2%
Rental/Other	60%	15%	12%	0%	5%	8%

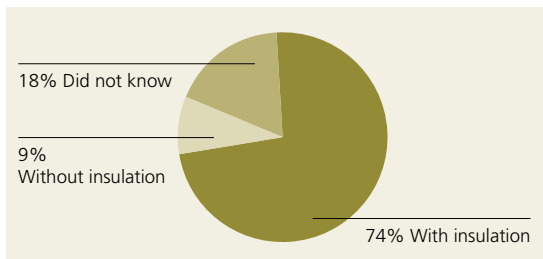
NOTE: Figures are rounded to the nearest whole number.

Brick veneer is the most popular material on external walls (61 per cent of dwellings) with timber (weatherboard) the next most popular at 18 per cent and double brick at 12 per cent.

Insulation

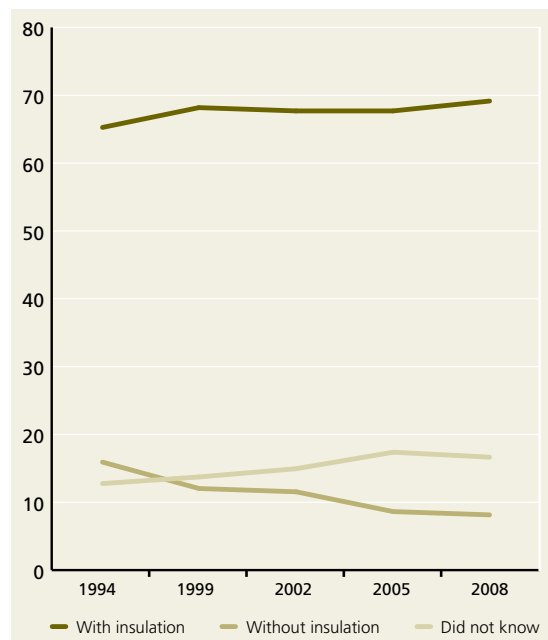
In total across Victoria, the ABS Environmental Issues Energy Use and Conservation 2008 survey indicates that the majority (74 per cent) of households report having insulation, while 9 per cent report having no insulation and 18 per cent don't know if they have insulation, as illustrated in Figure 3.

Figure 3: Reported presence of insulation in Victorian dwellings



The presence of insulation appears to have increased slightly over the last fifteen years, which is to be expected given the introduction of the minimum energy efficiency requirement for new homes. The recent trend in insulation levels is demonstrated in Figure 4.

Figure 4: Reported presence of insulation over time



The 2008 ABS survey also enabled an analysis of the presence of insulation in the rental versus owner occupied markets and these analysis results are shown in Table 4.

Table 4: ABS – Known presence of insulation in 2008

Ownership status	Region	Insulated	Not insulated	Unsure/don't know
Own/Purchasing	Metropolitan	87%	5%	8%
	Regional	86%	9%	6%
	All households	85%	7%	7%
Rental/Other	Metropolitan	46%	15%	49%
	Regional	39%	10%	41%
	All households	39%	14%	47%

NOTE: Figures are rounded to the nearest whole number.

These results indicate that insulation is higher in owner occupied homes than in rented homes. However, as almost half (47 per cent) of rental respondents are unsure if their homes have insulation, it is not possible to be certain what proportion of rental homes are not insulated. The results also indicate a higher proportion of rental homes in metropolitan areas are insulated than in regional areas, but given there is almost no difference in insulation levels in owner-occupied homes, this result may be due to the high number of survey respondents who were unsure of their dwelling's insulation.

Owner occupiers who have some insulation were also asked where the insulation was situated in their homes, and the results are:

- » roof/ceiling insulation – 99 per cent
- » floor insulation – 39 per cent.

Regional homes were more likely to have floor insulation (44 per cent) compared to metropolitan homes (37 per cent).

This trend for more floor insulation in regional areas may be a reaction to the more extreme temperature conditions in some of these areas.

Energy availability

The energy sources used by householders were surveyed and the results presented in Table 5.

Table 5: ABS – Fuel usage by ownership and locality

Ownership status	Region	Mains electricity	Mains gas	LPG	Wood	Other
Own/Purchasing	Metropolitan	100%	94%	5%	11%	3%
	Regional	100%	53%	21%	34%	4%
	All households	100%	82%	10%	18%	3%
Rental/Other	Metropolitan	100%	87%	2%	2%	2%
	Regional	100%	57%	15%	20%	2%
	All households	100%	79%	6%	7%	2%

NOTE: Some households may have more than one fuel type. Figures are rounded to the nearest whole number.

Table 6: ABS – Hot water systems by ownership and locality

Ownership status	Region	Peak electricity	Off-peak electricity	Mains gas	LPG	Solar	Don't know
Own/Purchasing	Metropolitan	8%	12%	78%	1%	2%	2%
	Regional	3%	51%	36%	5%	4%	2%
	All households	6%	24%	66%	2%	3%	2%
Rental/Other	Metropolitan	7%	9%	67%	0%	2%	16%
	Regional	5%	43%	41%	2%	2%	9%
	All households	7%	18%	60%	0%	2%	14%

NOTE: Some households may have more than one hot water system. Figures are rounded to the nearest whole number.

The Environmental Issues survey shows that electricity is available in all surveyed households, see Table 5 page 10, but the usage of other fuels varies depending on locality and ownership status, as follows:

- » Reticulated gas usage varies between owner occupied and rental homes in metropolitan areas, with the usage being significantly higher in owner occupied dwellings.
- » Reticulated gas usage varies little between owner occupied and rental homes in regional areas, where only about half of households use reticulated gas.
- » Liquefied petroleum gas (LPG) usage is higher in regional areas, but lower in rental dwellings than owner occupied.
- » Wood use is much higher in regional areas and higher in owner occupied than rental dwellings.

Hot water

The ABS data concerning household hot water systems is detailed in Table 6.

The use of peak electricity is higher in metropolitan areas, which is consistent with the greater use of instantaneous electric hot water systems in Class 2 dwellings, and with Class 2 dwellings making up a larger proportion of the housing market in metropolitan areas.

The use of off-peak electricity is much higher in regional areas, and the use of mains gas is lower, which is consistent with the reduced availability of reticulated gas in regional areas, particularly in the past when these dwellings were constructed. These results also suggest that off-peak hot water systems are more prevalent in owner occupied homes, but there are a large proportion of rental respondents who are not sure what type of hot water system they have, so this apparent trend may not accurately reflect what is happening in the market.

The use of LPG and solar hot water systems are slightly higher in owner occupied dwellings than rental dwellings.

Space heating

There is a considerable difference between the type of space heating used in metropolitan and regional dwellings, and in owner occupied and rental dwellings, as illustrated in Figure 5 and 6. The use of electric heating is slightly greater in regional areas than metropolitan and twice as great in rental housing as in owner occupied. Gas usage is correspondingly less in regional than metropolitan areas and is less in rental than owner occupied areas.

Figure 5: Main space heating fuel by locality

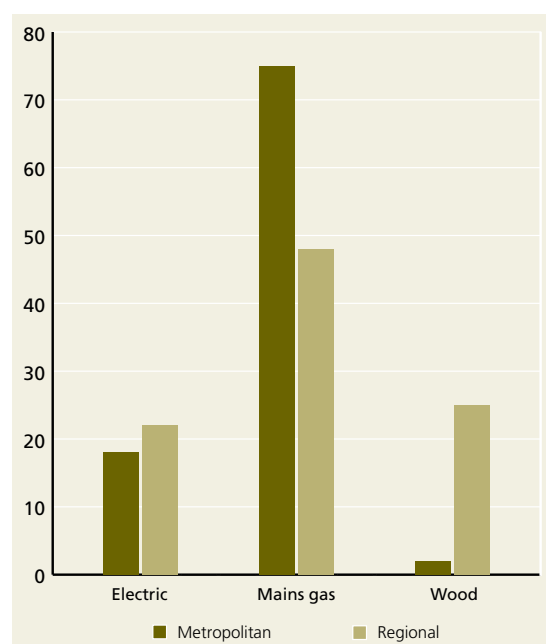
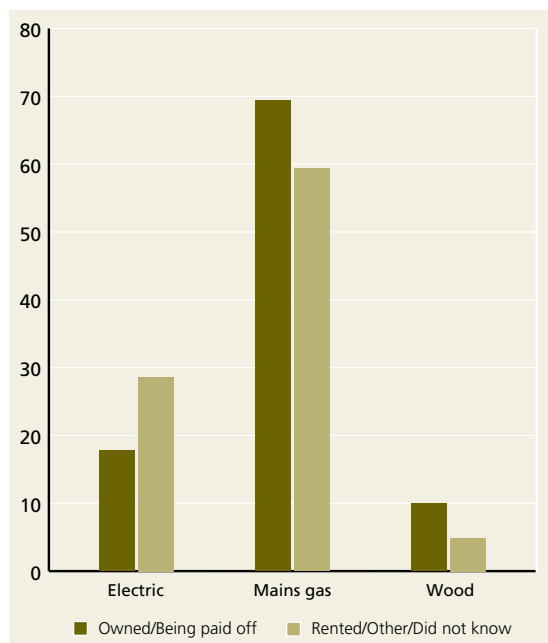


Figure 6: Main space heating fuel by ownership status



The detailed proportions of heating energy usage by ownership status and region are shown in Table 7. The main finding is the much higher use of electric heating in metropolitan rental compared to owner occupied dwellings, and the lower use of gas heating in metropolitan rental compared to owner occupied dwellings. These differences are less marked in regional areas.

Cooling

The ABS surveyed households that had at least one cooling system, with the results detailed in Table 8.

The results show that cooled owner occupied homes have a higher proportion of evaporative air conditioners than cooled rental homes (28 per cent compared to 22 per cent) but there is little variation in market share of evaporative air conditioners in regional versus metropolitan cooled homes.

Table 7: ABS – Space heater type by ownership and locality

Ownership status	Region	Electricity	Mains gas	Wood	Other
Own/Purchasing	Metropolitan	14%	79%	3%	2%
	Regional	20%	45%	26%	2%
	All households	16%	69%	10%	2%
Rental/Other	Metropolitan	28%	63%	1%	2%
	Regional	26%	49%	19%	3%
	All households	27%	59%	6%	2%

NOTE: Some households do not have heating and some have more than one type of heating. Figures are rounded to the nearest whole number.

Table 8: ABS – Space heater type by ownership and locality

Ownership status	Region	Reverse-cycle/heat pump	Refrigerate	Evaporative	Don't know
Own/Purchasing	Metropolitan	40%	29%	29%	2%
	Regional	52%	19%	28%	1%
	All households	43%	26%	28%	2%
Rental/Other	Metropolitan	32%	40%	22%	6%
	Regional	42%	32%	21%	6%
	All households	35%	47%	22%	6%

NOTE: Figures only refer to households with a recorded cooling system and some households have more than one cooling system. Figures are rounded to the nearest whole number.

There is a higher proportion of cooled owner occupied homes with reverse-cycle/heat pump systems than rental homes (43 per cent compared to 35 per cent) but a greater proportion of cooled rental homes have refrigerative systems (47 per cent). This may be a result of reverse-cycle systems being more common in the last few years, so the rental homes may, on average, simply have older systems, which are more likely to be refrigerative systems.

Conclusion

The 2008 ABS Environmental Issues: Energy Use and Conservation survey data provides a good overview of the Victorian housing market and some useful information to compare the condition of rental versus owner occupied. It is particularly useful in providing information on rental versus owner occupied housing concerning the availability of energy sources and the nature of space heating.

The ABS data is less useful (lacks sufficient data) to determine the comparison of rental to owner occupied housing for the extent and adequacy of insulation, the nature of hot water systems, the overall energy efficiency and the condition of the housing.

The limitation and gaps in the ABS data result largely from the difficulty in collecting accurate information about insulation, hot water systems and housing condition via surveys, especially as many renters don't know these details about their dwellings.

Victorian utility consumption household survey 2007

The Utility Consumption Household Survey (Utility Consumption survey) is based on a divided sample of over 2000 households, with approximately 50 per cent of the sample consisting of households whose main bill payer receives some type of government concession, and the remainder headed by people not receiving concessions. This means the sample is overly represented by concession households, which make up approximately 25 per cent of Victorian households. However, the original sample had been weighted for the presence of concession holders and for other factors, such as the number of country households, so the final weighted sample should be representative of the Victorian population. The discussed results are from the weighted sample. Note that small discrepancies in the summation and aggregation of the data may be the result of rounding errors.

The main focus of this analysis is to examine differences in the housing condition of rental versus owner occupied housing. The breakdown of rental versus owner occupied dwellings in the Utility Consumption survey is as follows:

- » owner occupied – 77 per cent
- » rental, private – 17 per cent
- » rental, public – 5 per cent
- » other – 1 per cent.

These distributions differ slightly from the ABS Environmental Issues survey data reported earlier, but not significantly, and the differences may have to do with the definitions of ownership used in the survey. This suggests that overall the survey is representative of the Victorian housing market, at least regarding ownership.

The size of the survey sample affects what results can be treated as statistically significant. Differences of more than 5 per cent between results for the rental and non-rental dwellings are generally needed before they can be treated as statistically significant. Differences of less than this will not be commented upon.

Class 1 and 2 dwellings by ownership type and locality

The underlying survey data of the final report of the Utility Consumption survey was analysed to provide the following results. The focus of the analysis was on the differences between private rental and owner occupied dwellings, and between regional and metropolitan housing.

The class of buildings used by renters and non-renters, and regional and metropolitan areas, were examined first to determine if this differed. The results are shown in Table 9.

Table 9: Class 1 and 2 dwellings by ownership type and locality

Ownership status	Region	Separate house	Semi-detached	Total class 1 dwellings	Low-rise flats/units	High-rise flats/units	Total class 2 dwellings
Own/Purchasing	Metropolitan	91%	7%	98%	2%	0%	2%
	Regional	98%	1%	99%	*	0%	*
	All households	93%	5%	98%	1%	0%	1%
Rental, private	Metropolitan	53%	29%	82%	17%	1%	18%
	Regional	71%	24%	95%	6%	0%	6%
	All households	58%	26%	84%	13%	3%	16%

NOTE: Figures are rounded to the nearest whole number.

The results indicate that the proportion of Class 2 rental is much higher than for owner occupied households. One per cent of owner occupied dwellings are Class 2 compared to 13 per cent of private rental dwellings. So, flats and units are principally used as rental dwellings. The results also indicate that Class 2 dwellings are much more common in the metropolitan area than in regional areas.

It should be noted that no high-rise dwellings were recorded as being owner occupied. This probably does not reflect the real situation in Victoria and is not consistent with the ABS data, so it may indicate a limitation of the sample and could skew the survey results.

Due to the low total number of Class 2 dwellings surveyed, less than 5 per cent of the sample and 80 dwellings in total, it was not considered worthwhile determining the results by building Class in the subsequent analyses, as in most cases any results for Class 2 dwellings would not be statistically meaningful. Consequently, all subsequent analysis includes Class 1 and 2 dwellings.

Thermal envelope of dwellings

Factors examined by the survey affecting the thermal properties of buildings include the age of the buildings, their construction and the presence of ceiling insulation.

Age of homes

The approximate age of dwellings was surveyed and the results examined to detect any differences between rental and non-rental dwellings. The results in Table 10 show that though there are slightly more houses which are older in the rental group than the owner occupier group, the difference is relatively small. Also, given the number of rental respondents who do not know the age of their homes, the results must be treated as inconclusive.

Construction materials

The construction materials used in houses also affects their thermal properties, though the effects can vary considerably depending on whether wall insulation has been installed.

Table 10: Age of homes by ownership type and locality

Ownership status	Region	Less than 3 years	Less than 15 years	Over 15 years	Unsure
Own/Purchasing	Metropolitan	1%	16%	81%	2%
	Regional	3%	15%	80%	2%
	All households	2%	16%	81%	2%
Rental, private	Metropolitan	1%	12%	76%	12%
	Regional		9%	85%	7%
	All households	1%	11%	79%	10%

NOTE: Figures are rounded to the nearest whole number.

Table 11: Construction materials by ownership type and locality

Ownership status	Region	Brick veneer	Double brick/cavity brick	Weather-board/timber	Fibro-cement	Concrete/besser block	Other material/can't say
Own/Purchasing	Metropolitan	67%	10%	19%	1%	2%	2%
	Regional	56%	6%	30%	3%	1%	6%
	All households	63%	8%	23%	2%	2%	2%
Rental, private	Metropolitan	65%	15%	17%	1%	2%	*
	Regional	51%	4%	37%	3%	1%	6%
	All households	65%	12%	19%	2%	2%	*

NOTE: Figures are rounded to the nearest whole number.

Again, the differences in the types of construction materials used in rental versus owner occupied homes are relatively slight. Rental homes consist of slightly more double brick homes and slightly less weatherboard/timber homes, than owner occupied homes. Likewise, the variation between regional and metropolitan areas is small.

Insulation

With regard to insulation, the results show the presence of ceiling insulation differs significantly between rental and non-rental dwellings, as shown in Table 12.

The breakdown shows the majority of owner occupied dwellings (81 per cent) are completely insulated, but only 27 per cent of householders believe their rental dwellings are fully insulated. There is no significant difference in reported insulation levels between metropolitan and regional areas for owner occupied dwellings, but in private rental dwellings the reported levels of insulation are lower in regional areas.

The results for rental dwellings may overstate the proportions that are uninsulated, due to the large number of rental respondents who don't know if their dwelling is insulated. However, even assuming that all the 'don't know' responses were from insulated dwellings, the proportion of rental dwellings insulated would still be much less than for owner occupied dwellings.

It is worth noting the reported levels of insulation in owner occupied homes are similar to those reported by the ABS Environmental Issues survey for the owner occupied dwellings, but differ for the rental dwellings. Also the ABS survey encountered a similar problem to Utility Consumption survey, with renters not knowing about their insulation.

The lack of insulation in rental dwellings is the most significant difference between rental and non-rental dwellings found, as lack of insulation significantly affects the comfort of the home and its heating and cooling energy requirements.

Table 12: Presence of ceiling insulation by ownership type and locality

Ownership status	Region	Completely insulated	Partially insulated	Total some insulation	Not insulated	Don't know
Own/Purchasing	Metropolitan	81%	7%	88%	7%	5%
	Regional	81%	8%	89%	6%	5%
	All households	81%	8%	89%	6%	5%
Rental, private	Metropolitan	24%	5%	29%	28%	43%
	Regional	33%	8%	41%	26%	32%
	All households	27%	6%	33%	28%	40%

NOTE: Figures are rounded to the nearest whole number.

Table 13: Type of hot water system by ownership type and locality

Ownership status	Region	Gas storage	Gas instantaneous	Electric standard	Electric heat pump	Solar gas	Solar electric	Other/cant say
Own/Purchasing	Metropolitan	57%	29%	12%	1%	1%	*	2%
	Regional	59%	14%	23%		1%		2%
	All households	54%	26%	17%	1%	1%	1%	1%
Rental, private	Metropolitan	46%	31%	18%				6%
	Regional	55%	14%	29%			1%	2%
	All households	49%	26%	21%				4%

NOTE: Some households may have more than one hot water system. Figures are rounded to the nearest whole number.

Main appliances

Hot water systems

The table shows there is a slightly higher use of electric hot water systems in private rental than in owner occupied dwellings, with 21 per cent compared to 17 per cent using electric hot water systems, and a corresponding lower use of gas storage systems. There is also a significantly lower use of gas and higher use of electric hot water systems in regional areas compared to metropolitan areas, as would be expected given the lower penetration of reticulated gas in regional areas.

The penetration of gas instantaneous systems was identical in both owner occupied and private rental dwellings.

When these results are compared to those of the ABS survey, see Table 6 page 11, it is apparent that there are significant differences in the findings of the two surveys regarding the market shares of gas versus electric hot water systems. Given the Utility Consumption survey sample has such a heavy bias towards concession card holders, this raises questions concerning biases in the sample that can not be corrected by sample weighting and may skew the survey results.

According to these results over twice as many rental dwellings use electric heating as their main form of heating, compared to owner occupied dwellings. This finding is broadly consistent with the Environmental Issues survey findings.

The results also show a smaller proportion of rental dwellings use electric heating in regional areas than in metropolitan areas, and a higher proportion of regional rental dwellings use gas heating than metropolitan rental dwelling. These results are not what would be expected, given the historically lower penetration of reticulated gas in regional areas. The results for each ownership type and locality are also inconsistent and in almost all cases are significantly different than the ABS survey data results, see Table 7 page 12. Some of these differences may be due to differences in the questions in the two surveys, but the differences continue to ask if the nature of the Utility Consumption survey sample is biased and the survey results skewed.

A more detailed breakdown of heating types by ownership status is detailed in Table 15.

Table 14: Main space heater fuel type by ownership type and locality

Ownership status	Region	Gas heater	Electric heater	Other heater	No main heater
Own/Purchasing	Metropolitan	89%	6%	5%	*
	Regional	75%	13%	11%	
	All households	85%	9%	7%	*
Rental, private	Metropolitan	73%	24%	2%	2%
	Regional	80%	17%	2%	1%
	All households	75%	22%	2%	2%

NOTE: Figures are rounded to the nearest whole number.

Table 15: Space heating technology by ownership type

Ownership status	Gas space	Gas ducted	Hydronic	Electric portable	Electric heat pump	Built-in electric/slab/central	Wood	Other	No main heater
Own/Purchasing	35%	48%	2%	2%	5%	2%	6%	1%	1%
Rental, private	50%	24%	1%	8%	3%	8%		2%	4%

NOTE: Some households may have more than one heating system. Figures are rounded to the nearest whole number.

Table 16: Cooling system type by ownership type and locality

Ownership status	Region	No Cooling System	Evaporative Cooling	Refrigerative Cooling	Fans
Own/Purchasing	Metropolitan	6%	30%	48%	47%
	Regional	5%	28%	45%	67%
	All households	6%	30%	47%	53%
Rental, private	Metropolitan	14%	18%	31%	53%
	Regional	6%	24%	33%	67%
	All households	12%	20%	32%	57%

NOTE: Some households may have more than cooling system. Figures are rounded to the nearest whole number.

Table 17: Cooling technology by ownership type and locality

	Portable evaporative	Wall mounted evaporative	Ducted evaporative	Portable refrigerative	Single-room refrigerative	Multi-room split-system refrigerative	Ducted refrigerative
Own/Purchasing	5%	7%	18%	2%	35%	9%	3%
Rental, private	7%	8%	6%	5%	20%	3%	3%

NOTE: Figures are rounded to the nearest whole number.

The breakdown reveals that the penetration of gas central heating is much lower in rental homes than in owner occupied and the reliance on portable or built-in electric heating is higher for rental homes.

Cooling

The cooling systems used in Victorian housing were then examined. The types of cooling systems present were first examined. The results show that the penetration of evaporative and refrigerative air conditioning is much higher in owner occupied homes than in rental homes, and the penetration of refrigerative is much higher than evaporative systems, almost 50 per cent greater. Approximately 50 per cent of homes have fans and a small, but significant, percentage have no cooling system at all.

There are minor differences in the penetration of cooling systems into regional and metropolitan dwellings, but no overall trend is apparent. The exception could be that regional rental homes have more cooling than metropolitan rental homes.

A more detailed breakdown of the type of air conditioning systems by rental and owner occupied dwellings is shown in Table 17.

These results show that the penetration of ducted evaporative air conditioning is much higher in owner occupied homes, with private rental and owner occupied dwellings having a roughly similar use of portable or wall mounted evaporative air conditioning. In comparison there is a similar low penetration of ducted refrigerative air conditioning in owner occupied and private rental dwellings, but the use of single and multi-room refrigerative air conditioning is much higher in owner occupied.

However, when the Utility Consumption survey results, see Table 16 page 17, are compared to those of the ABS survey, see Table 8 page 12, there are significant differences in the findings of the two surveys regarding the market shares of the different air conditioner types. The Utility Consumption survey results appear to considerably understate the penetration of refrigerative air conditioning, which may be due to the large number of concession card holders in the sample, though the sample is weighted to remove this influence. Given the extent of the differences, the value of the Utility Consumption survey sample for investigating cooling technologies must be questioned.

Perceived difficulties in heating

Survey respondents were asked if they had difficulty in heating their homes in cooler months, and large differences were found between the results for owner occupiers and renters. The proportions reporting difficulties with heating are shown in the Table 18.

Table 18: Difficulties with heating by ownership type and locality

Ownership status	Region	Report difficulties with heating
Own/ Purchasing	Metropolitan	27%
	Regional	37%
	All households	30%
Rental, private	Metropolitan	53%
	Regional	50%
	All households	52%

NOTE: Figures are rounded to the nearest whole number.

The reasons given by the majority of households for these difficulties are in Table 19.

Table 19: Reasons for perceived difficulties in heating by ownership type and locality

Ownership status	Region	Takes a long time to heat	Hard to maintain constant temperature	Too expensive to heat	Ineffective or defective heater	No insulation	Design of house	Draughts/poor condition/poor construction
Own/ Purchasing	Metropolitan	3%	4%	4%	2%	3%	8%	7%
	Regional	6%	4%	3%	2%	5%	11%	12%
	All households	4%	4%	4%	2%	3%	9%	8%
Rental, private	Metropolitan	15%	13%	12%	9%	17%	12%	13%
	Regional	12%	5%	6%	6%	14%	16%	24%
	All households	14%	11%	10%	8%	16%	13%	17%

NOTE: Some households may have more than one reason. Figures are rounded to the nearest whole number.

Four of the reasons given for the perceived difficulties in heating the dwellings relate to physical aspects of the houses, which affect heating energy requirements and effectiveness. These factors are:

- » ineffective or defective heater
- » no insulation
- » poor design of house
- » draughts or poor condition or poor construction of house.

With the exception of poor house design, these perceived physical problems with the houses are over twice as prevalent in rental homes than in owner occupied homes. There are no apparent trends in the differences between metropolitan and regional dwellings regarding these perceived problems.

Some care must be taken when interpreting these results. For example, a heater being ineffective or a house being draughty can be a personal perception and householders may be more likely to be critical of a rental home than their own home. Also, the results pertaining to the lack of insulation are inconsistent with the survey's other findings about the use of insulation.

Conclusion

The Utility Consumption survey investigates a number of topics of importance to understand the energy performance of rental housing. However, the results concerning many of these topics differed from the results of the ABS Environmental Issues survey that addresses similar topics. Some of this variation may be due to differences in the wording of the surveys' questions, but other variations may be due to the un-representative sample used in the Utility Consumption survey (such as the large number of concession holders and limited sampling of regional areas). This raises the possibility that some of the results of the Utility Consumption survey that relate to energy performance are skewed, so the results must be treated with caution.

The Utility Consumption survey results indicate that rental housing does not generally differ, or differs little, from owner occupied housing in age or in construction type. However, the proportion of rental homes with ceiling insulation is significantly lower than owner occupied homes, and at least 28 per cent of rental homes lack insulation. The lack of ceiling insulation significantly affects the comfort of homes and their heating/cooling energy costs and requirements. These results are broadly in line with the findings of the ABS survey results, but both surveys suffer from the problem that many rental respondents do not know if they have insulation.

The Utility Consumption survey provides data on how the major appliances of rental and owner occupied homes differ. Rental homes have a slightly greater use of electric hot water systems and a much greater use of electric heating systems, which makes the energy use of rental homes more expensive for householders. This finding was supported by the ABS survey results.

The Utility Consumption survey data also shows that half of rental households report difficulties with heating their home in cooler months, 52 per cent compared to 30 per cent of owner occupied households. Physical causes for these problems are much more prevalent in rental than owner occupied dwellings. As these topics are not addressed by the Environmental Issues survey, the results can not be collaborated.

The Utility Consumption survey data provides an initial indication of the relative energy performance and condition of rental housing versus owner occupied housing in Victoria, but the results must be treated with caution given the nature of its sample and the variation in the results from the ABS survey. The Utility Consumption survey does not provide much insight into the condition of the rental buildings, or of their appliances, as these topics were not directly addressed.

Victorian energy and water task force 2008

The Energy and Water Task Force (Task Force) is an ongoing program established by the Victorian Government that provides free home energy audits and retrofits to low income households to improve home comfort and reduce energy bills. The Task Force undertakes simple energy improvement measures including, insulating ceilings, installing window coverings and sealing gaps around windows and doors. Geographic areas containing high proportions of low income households are targeted. These areas are typically, but not exclusively, communities designated as Neighbourhood Renewal areas. Public and private housing tenants and owner occupiers with a health care card can participate.

The information from the audits undertaken by the Task Force on rental properties in 2008 was obtained in order to examine the housing condition and energy performance of the Task Force audited rental homes. Data on 584 rental households was obtained. The distribution of the sample was Melbourne metropolitan area, 23 per cent, and regional areas, 77 per cent. Therefore the Task Force data is not representative of all Victorian households, as it is heavily biased towards the regional areas.

The regional and metropolitan data was therefore analysed separately.

Thermal envelope of dwellings

Construction materials

The type of construction materials are shown in the Table 20 and indicate that there are large differences between the metropolitan and regional dwellings surveyed.

Table 20: Construction materials		
Construction materials	Metropolitan	Regional
Brick veneer	42%	72%
Double brick		1%
Tilt slab concrete	32%	1%
Weatherboard	19%	20%
Fibro cement	6%	4%
Other		2%

NOTE: Figures are rounded to the nearest whole number.

Brick veneer and tilt slab concrete dominate the metropolitan houses, with the slab concrete construction suggesting that many of these may be apartments or flats. There are almost no tilt slab concrete homes in the regional sample, with the vast majority being brick veneer. About 20 per cent of homes are weatherboard in both localities.

Comparing the above results to the Utility Consumption survey, there are significant differences in the breakdown of construction materials. Even allowing for the sampling limitations of the Utility Consumption survey, it suggests that the dwellings in the Task Force audit are not representative of the Victorian rental market, and the survey results cannot be used to draw conclusions about the Victorian rental market.

Insulation

Table 21 shows that approximately 15 per cent of the rental homes have no insulation and a further approximately 30 per cent have inadequate levels of ceiling insulation. This is significant, as lack of ceiling insulation significantly affects the comfort of a dwelling and its heating and cooling energy requirements.

It is also interesting that the proportion of those with inadequate insulation (0-100 mm) is much greater than the proportion with no insulation, suggesting that surveys that simply ask about the presence of insulation may greatly underestimate the extent of inadequate insulation.

Approximately half of the dwellings have adequate ceiling insulation.

Table 21: Ceiling insulation levels

Insulation	Metropolitan	Regional
None	13%	15%
0-50mm	8%	7%
50-100	31%	20%
100-150	48%	55%
Unknown		2%

NOTE: Figures are rounded to the nearest whole number.

These results cannot be compared to the results of the Environmental Issues or the Utility Consumption survey, as their information was collected in a completely different way and contain such large proportions of 'unknown' responses.

Main appliances

Hot water systems

Table 22 shows the penetration of different types of hot water system technologies.

Table 22: Penetration of hot water system technologies

Hot water heating technology	Metropolitan	Regional
Electric off-peak – storage	5%	26%
Electric off-peak – instantaneous		1%
Natural gas – storage	78%	43%
Natural gas – instantaneous	14%	12%
LPG	1%	1%
Solar (electric)		7%
Unknown	1%	9%

NOTE: Figures are rounded to the nearest whole number.

The results show that gas hot water systems are the most frequently used, with 82 per cent of the metropolitan and 56 per cent of the regional dwellings using natural gas. The use of electric hot water systems is much higher in regional dwellings, 27 per cent compared 5 per cent, and solar hot water systems are also more common in regional areas, 7 per cent compared to none.

Comparing these results to those of the ABS and Utility Consumption surveys, reveals that the Task Force results are inconsistent with both surveys, again showing that they cannot be applied to the broader Victorian rental market.

Space heating

Table 23 shows clear patterns regarding the use of electric and gas heating. Almost all houses have space heating, metropolitan houses almost exclusively use natural gas heating and regional dwellings are almost equally divided between electric and natural gas.

Table 23: Space heating fuel source

Space heating fuel source	Metropolitan	Regional
Electric	6%	45%
Nat gas	94%	51%
LPG		1%
Wood		2%
None		1%

NOTE: Figures are rounded to the nearest whole number.

The use of different heating technologies is shown in the Table 24.

Table 24: Penetration of space heating technologies

Space heating type	Metropolitan	Regional
Electric fan	4%	
Electric portable	1%	
Electric radiant	2%	2%
Electric off-peak		12%
Electric reverse-cycle/heat pump		24%
Firewood/slow combustion		2%
Gas central	12%	1%
Gas radiant	36%	19%
Gas space/wall heater	43%	31%
Unknown		9%

NOTE: Some households may have more than one source of heating or no source of heating. Figures are rounded to the nearest whole number.

The results show the use of reasonably efficient reverse-cycle heaters is reasonably high in regional rental dwellings. They also show that very few (12 per cent) of metropolitan rental houses have central heating and almost all rely on room heating.

One encouraging finding is that the majority of electric heating in the surveyed regional homes is reverse-cycle air conditioning/heat pumps, which are very efficient electric heaters.

Comparing these results to the Environmental Issues or Utility Consumption surveys, shows the Task Force results are inconsistent with both surveys, so they cannot be applied to the broader Victorian rental market.

Cooling

The use of different cooling technologies is examined in Table 25.

Table 25: Penetration of cooling technologies

Cooling system type	Metropolitan	Regional
Evaporative ducted AC	5%	7%
Evaporative portable	3%	1%
Fan	14%	19%
Refrigerative AC	30%	47%
None	47%	24%
Unknown		2%

NOTE: Some households may have more than one source of cooling or no source of cooling. Figures are rounded to the nearest whole number.

A large proportion of rental dwellings have no cooling system, not even a fan. However, 35 per cent of metropolitan and 54 per cent of regional houses have a fixed air conditioning system installed. Of these, the vast majority were refrigerative air conditioning.

Comparing these results to the Environmental Issues or Utility Consumption survey, continues to demonstrate the Task Force results are inconsistent with both surveys and cannot be applied to the broader Victorian rental market.

Conclusion

The dwellings audited in the Task Force survey are all low income earners, so the results were expected to differ from those of the main Victorian rental market. This was confirmed by comparing the results to those from the Environmental Issues and the Utility Consumption surveys, as invariably the Task Force results differed significantly. Consequently, the Task Force data is of limited use in researching energy performance and housing conditions in the Victorian rental market.

However, one interesting aspect of the Task Force research is that it created more definitive results regarding the presence of insulation than either the ABS or the Utility Consumption survey.

MEFL take action audits

The Moreland Energy Foundation Limited (MEFL) completed over 100 household audits, of which fifteen are known to be rental properties. These households were recruited through advertising and contacts and were offered a free home energy audit. The rental households are located in inner city and middle-distance suburbs, such as Glenroy, Brunswick, Coburg and Oak Park.

Due to the small number of responses, it is not useful to supply statistical information and tables concerning these dwellings, but the following observations are noted:

- » Age of dwellings ranged, with around 40 per cent from pre-1920 or the 1920's, 40 per cent from the 1950s and 1960s and the remainder more recent.
- » House orientations are approximately 40 per cent north facing with the rest primarily east facing.
- » Building materials are mostly weatherboard, with the remainder mostly brick veneer.
- » Hot water systems are 85 per cent gas and the rest electric. All but one of the hot water systems has adjustable thermostats, but none were set on a low temperature setting at the time of the audit. A minority of the hot water systems have lagging (hot water pipe insulation).
- » Air conditioning is in around 65 per cent of houses, with half of these being central, ducted evaporative and half refrigerative systems.
- » Ceiling insulation was recorded for eleven dwellings, of which 75 per cent have ceiling insulation. Only one dwelling has wall insulation.
- » Curtains with pelmets are found in about one-third of the homes, but no homes have double glazing.

This sample of homes is too small to draw any conclusions about the broader Victorian rental market. However, it confirms that onsite audits will be more effective at supplying information on important housing characteristics, such as ceiling insulation.

Existing data: summary and conclusion

Main findings

The main findings, principally derived from the ABS Environmental Issues survey, with some input from the Utility Consumption survey, are:

- » Half of rental housing is semi-attached houses or flats/units, while the vast majority of owner occupied dwellings are separate houses.
- » Rental housing generally does not differ or differs little from owner occupied housing in age or in construction type.
- » The proportion of rental homes with ceiling insulation is probably significantly lower than owner occupied homes, with at least 14 per cent of rental homes reporting that they lack insulation. However, many renters don't know if their dwelling has insulation, so it may be a much higher proportion.
- » It is unclear if rental are different from owner occupied homes in their use of electric hot water systems, as many renters are not sure what type of hot water system they have.
- » A greater proportion of rental dwellings compared to owner occupied homes use electric heating systems, which makes the energy use of rental homes more expensive for householders.
- » Half of rental households report difficulties with heating their home in cooler months, 52 per cent compared to 30 per cent of owner occupied households. Physical causes for these heating problems are much more prevalent in rental than in owner occupied dwellings.

Data sources and limitations

The most useful insights in the energy performance and housing condition of Victorian rental homes are from the ABS Environmental Issues survey because it covers a number of energy performance related topics and uses an apparently representative sample.

The Utility Consumption survey covers a wider range of topics, but does not use a representative sample, which appears to skew some results. This was noticed when the results were compared to the ABS survey findings.

The Task Force data has limitations, as it comes from a very unrepresentative sample of rental households.

Limitations and gaps in existing data

The ABS survey and to some extent the Utility Consumption survey are good sources of information on the general nature of the Victorian housing market and rental housing. Such surveys provide useful information on:

- » age of housing
- » construction materials
- » type and fuel of major appliances (hot water systems, air conditioners, space heaters)
- » ceiling insulation.

The main limitation of the existing data is that survey data does not supply sufficient detailed information on the extent of energy performance or housing condition of rental homes. The limitations of the surveys include:

- » presence of insulation not checked
- » quality of insulation not checked
- » age, condition and efficiency of major appliances not obtained
- » exact age of houses not supplied.

There are also gaps in the survey data, as topics have not been covered and information is not available on:

- » ceiling insulation and quality
- » overall condition
- » draughts and air tight aspects
- » orientation
- » double glazing and curtain/pelmets
- » wall insulation
- » external shading
- » effectiveness of design for heating and cooling.

The 2008 Task Force audits provide more detailed information on some aspects of the dwellings audited, but the survey sample is not representative of Victorian rental properties, so it does not effectively address the data limitations and gaps. The MEFL audits also present too small a sample to meet this data gap.

Conclusion

There are limitations and gaps in the existing data concerning the energy performance and housing condition of Victorian rental housing. More comprehensive housing surveys, orientated towards rental households only, will solve some of the data limitations, but the use of surveys has methodological limitations that cannot be overcome. The main limitation is that surveys rely on the householder being able to supply accurate information on the dwelling and appliances, which renters cannot do in all instances. The alternative to surveys is on-site audits, which have the advantage that a trained auditor can collect more accurate and detailed information, and they can do so objectively, which some householders find difficult.

Ideally, a representative sample of Victorian rental properties is needed with a full energy audit completed for each dwelling in order to supply detailed data on the energy performance or housing condition of rental homes. This is difficult as it is time consuming and expensive.

Based on the existing data analyses, it was recommended that a smaller sample of Victorian rental properties be audited, and the sample of Victorian rental properties to be chosen on the following key dimensions.

- » regional/metropolitan split, with the majority from Melbourne
- » spread of dwelling ages
- » spread of dwelling types, i.e. separate houses, semi-attached, flats.

The audit sample results are not as accurate as a larger survey, and invariably it is difficult to recruit to match a structured sample profile, but they provide a much better insight into Victorian rental housing conditions than presently exists.

The on-site audits were recommended to cover (at least):

- » type of dwelling, age and orientation
- » overall condition
- » ceiling insulation – presence and quality if possible
- » draughts
- » major appliances – type, age, condition and efficiency
- » windows – leaks, curtains, pelmets and double glazing
- » retrofitting options and barriers
- » presence of energy savings measures.

The analysis of the existing data reveals a need to conduct more detailed on-site audits on rental housing. As recommended, on-site audits need to collect data on:

- » type of dwelling, age and orientation
- » overall condition
- » ceiling insulation – presence and quality if possible
- » draughts
- » major appliances – type, age, condition and efficiency
- » windows – leaks, curtains, pelmets and double glazing
- » retrofitting options and barriers
- » presence of energy savings measures.

In response to this, EnergyConsult and MEFL arranged and conducted 52 audits of rental properties and obtained data on nine rental properties in Mildura that had previously been audited. The audits were conducted by four experienced auditors, contracted by MEFL and by the Kildonan organisation, who also supplied the Mildura data. Summaries of the responses and data collected are presented below.

Audit results

Complete data was not recorded for all audits, so information available on some housing characteristics may be for less than 61 households. The percentages presented in the tables are based on the number of audits where relevant information was collected.

Location and numbers

Audits were conducted in the following suburbs:

- » Brunswick
- » Brunswick East
- » Brunswick West
- » Coburg
- » Coburg North
- » Collingwood
- » East Brunswick
- » Fawkner
- » Glenroy
- » Hadfield

- » Meadow Heights
- » North Carlton
- » North Coburg
- » Northcote
- » Pascoe Vale South
- » West Preston.

In addition there were nine relevant audits from Mildura. The breakdown of audits by location is shown in Table 26.

Suburb/location type	Number	Per cent
Inner	25	41%
Middle	16	26%
Outer	11	18%
Regional	9	15%

NOTE: Figures are rounded to the nearest whole number.

Mildura analysis

As Mildura has such a different climate to Melbourne, as well as other social and economic differences, it was considered possible that the results of the Mildura audits would differ significantly from the other audits and should be analysed separately. To verify this, the nine audit results were analysed with the following results:

- » eight houses were detached and one a flat/unit
- » 75 per cent were brick veneer
- » house ages ranged from pre-1950s to post-2000
- » bedroom numbers ranged from two to four
- » 25 per cent had mains gas connected
- » no information was recorded about ceiling insulation
- » rents ranged from around \$350 to \$1900 per month.

When compared to the metropolitan audit results, the Mildura results were not significantly different. Mildura areas of difference included:

- » more detached houses
- » more brick veneer construction
- » less connections to mains gas
- » slightly more expensive rents.

The lower use of gas is the greatest difference between the Mildura and the metropolitan houses, and the difference that most affects energy costs, but otherwise these houses did not differ greatly in their likely energy performance. Consequently, the Mildura house audit results are analysed and presented with the other house results for the remainder of the report. This analysis also allows for comparisons to the other housing surveys.

Housing age, type and costs

Important determinants of housing energy efficiency were expected to be the age of the housing, the type of housing and the rents paid for the houses. Information on all these characteristics was collected by the audits and distributions of the houses sampled on these dimensions are presented in Tables 27 to 29.

Table 27: Breakdown of houses by age

House age range	Number	Per cent
Pre-1950	20	33%
1950s	5	8%
1960s	8	13%
1970s	3	5%
1980s	6	10%
1990s	5	8%
Post-2000	12	19%

NOTE: Figures are rounded to the nearest whole number.

Table 28: Breakdown of houses by type

House type	Number	Per cent
Detached	29	47%
Semi-detached/ townhouse	14	23%
Unit/apartment/flat	17	28%

NOTE: Figures are rounded to the nearest whole number.

Table 29: Breakdown of houses by rental cost

House monthly rental (\$ per month)	Number	Per cent
\$999 or less	11	18%
\$1000 to \$1499	29	48%
\$1500 to \$1999	13	21%
\$2000 or more	2	3%

NOTE: Figures are rounded to the nearest whole number.

Table 29 suggests that a reasonable variety of houses of different rents was obtained.

Tables 27 to 29 suggest that a good cross-section of house ages, types and costs was audited.

Size and construction of houses

A cross-section of houses of different sizes was audited. The breakdown by bedrooms and house shows the variety in Victorian rental properties.

Table 30: Breakdown of houses by bedroom numbers

Number of bedrooms	Number	Per cent
1	4	10%
2	16	38%
3	17	40%
4	5	12%

NOTE: Figures are rounded to the nearest whole number.

The distribution of number of bedrooms is very similar to that obtained in the Utility Consumption survey.

Table 31: Breakdown of houses by house area

Size of house (metres squared)	Number	Per cent
Compact: <100m ²	9	15%
Small: 100-149m ²	18	30%
Medium: 150-249m ²	22	36%
Large: 250-350m ²	4	7%

NOTE: Figures are rounded to the nearest whole number.

The results show that the majority of rental houses audited are small to medium sized houses, with two or three bedrooms.

It is worth noting that, generally, for houses of similar construction and design, that larger houses require more energy to operate, with more lights to power, a greater area to heat or cool and longer pipe runs for hot water (hence greater heat losses).

It was assumed that rents may be higher for larger houses, so tenants of larger houses could face the financial burden of greater rents and greater energy bills. An analysis of the mean rents, by size of residence, shows some evidence for this. There is an \$85 per month difference between the average compact house and a medium sized house, but only a \$5 per month difference between a small and medium sized house. There are too few large homes to obtain a meaningful average.

The houses also varied in their number of storeys as follows:

- » Single storey – 75 per cent
- » Double storey – 20 per cent
- » Multistorey (flats etc) – 5 per cent.

The main construction materials of the houses sampled varied, as shown in Table 32.

Table 32: Breakdown of houses by main wall materials

Wall materials	Number	Per cent
Brick veneer	31	51%
Weatherboard	12	20%
Fibro/render sheet	2	3%
Double brick/concrete block/stone	13	21%
Other	2	3%

NOTE: Figures are rounded to the nearest whole number.

The distribution of these construction types is very similar to that found in the ABS survey reported in Table 3 page 9.

Thermal envelope

The factors audited that influence a house's thermal envelope are:

- » ceiling insulation
- » wall insulation
- » wall construction

- » floor construction
- » window materials
- » draughts.

The breakdown of these factors is shown in Tables 33 to 37.

Information regarding the presence of ceiling insulation was collected for 44 of the total 61 audited dwellings. Information on insulation could not be collected for approximately half of the remaining 18 homes, because of lack of roof space access, and for the other half, because the nine audits conducted in Mildura did not consider insulation. The implication is the audit information of insulation is really only relevant to metropolitan rental housing.

Of the 44 metropolitan dwellings where insulation was examined, the results suggest:

- » 50 per cent of rental homes are uninsulated or effectively uninsulated (i.e. they have very thin insulation or only partially insulated ceilings).
- » 27 per cent are inadequately insulated, with insulation of 90 mm or less.
- » 11 per cent are adequately insulated.
- » 11 per cent were insulated, but it could not be determined how effectively.

Compared to the ABS survey data (see Table 4 page 10) the present audits obtained insulation data on a much greater proportion of the sample (71 per cent) and found a much greater proportion of rental homes are uninsulated or effectively uninsulated; 36 per cent of the total sample compared to 15 per cent of the ABS sample.

Table 33: Breakdown of houses – presence of ceiling insulation

Ceiling insulation	Number	Per cent of all audits	Per cent of those with insulation data
No insulation	19	31%	43%
Insulation 30mm or less, or ceiling partially insulated	3	5%	7%
Insulation 90mm or less	12	20%	27%
Insulation 120mm or less	3	5%	7%
Insulation 180mm or less	1	2%	2%
Insulation more than 180mm	1	2%	2%
Insulated, but thickness was not measured	5	8%	11%
Not reported/could not view (1)	18	29%	N.A

NOTE: Some audits reported being unable to access ceiling to view insulation, while others simply did not complete this section. Figures are rounded to the nearest whole number.

These audit results lead to the following conclusions:

- » Collecting insulation data via on-site audits is a much more reliable method of obtaining data than occupant surveys, producing less 'Don't know' responses.
- » A significant proportion, possibly one-third to half of rental houses may be effectively uninsulated, if the Victorian rental stock has similar characteristics to the sample of houses audited.

Other facts revealed in the analysis of insulation were:

- » Of the insulated houses, approximately 60 per cent have glass fibre insulation, with most of the remainder having cellulose fibre.
- » All of the newer homes (post-2000) appear to have adequate insulation.
- » No house was reported to have wall insulation, which probably reflects the difficulty of assessment.
- » In 29 per cent of cases, the roof space could not be accessed to install or check insulation.
- » In 93 per cent of cases where information on ceiling insulation was recorded, insulation was viewed by the auditor.

Analysis of floor construction, window materials and draughts was conducted on approximately 50 homes, where data was available. Tables 34 to 37 display the results.

Table 34: Breakdown of houses – floor construction

Floor construction	Number	Per cent
Suspended timber	35	70%
Concrete slab	16	30%

NOTE: Figures are rounded to the nearest whole number.

These results suggest that approximately two-thirds of homes could potentially be retrofitted with floor insulation, assuming that those with suspended timber floors have not been previously fitted.

Table 35: Breakdown of houses – window material

Window materials	Number	Per cent
Aluminium	19	37%
Timber	29	57%
Other	3	6%

NOTE: Figures are rounded to the nearest whole number.

Aluminium windows, in particular, permit warmth to enter or leave a house, making heating and cooling more difficult, unless double-glazed windows with thermal breaks are installed.

Table 36: Breakdown of houses – internal window protection in main living area

Number of living area windows with internal protection	Number of houses	Per cent of houses
No windows	1	2%
1 Window	21	43%
2 Windows	11	23%
3 Windows	11	23%
4 Windows	3	6%
5 or more windows	1	2%

NOTE: Figures are rounded to the nearest whole number.

Internal protection on windows, such as curtains with pelmets, assists in limiting internal heat loss and is used in most of the rental houses where this data was obtained. The results suggest that many windows are unprotected in the living area, which is the area of the house most likely to be heated or cooled. Note, there may be more houses with unprotected windows, but the auditors may not have recorded this.

Table 37: Breakdown of houses – extent of draught prevention required in living areas

Extent draught prevention required	Number	Per cent
Low	22	46%
Medium	20	43%
High	5	11%

NOTE: Figures are rounded to the nearest whole number.

The analysis of draughts indicates that over half of the homes require draught prevention on two or more sources of draughts in the living areas, i.e. a medium or high level of draught prevention was needed. The sources of draughts are door surrounds, window casings, door bottom gaps, window panes, exhaust fans and external wall vents. Draughts were assessed by visual inspection and by observing smoke movement.

Rent, comfort and energy efficiency

The thermal envelope of a house makes a major difference to the comfort of the home and its energy efficiency, with ceiling insulation and draughts especially affecting comfort. Consequently, the relationship between rental costs and ceiling insulation, and the relationship between rental costs and the requirement for draught prevention was examined.

The analysis revealed the following:

- » There is no apparent relationship between the presence of insulation and rental costs. However, the sample numbers are too low to be certain.
- » Lower cost rental homes require more medium to high levels of draught prevention in their living areas, compared to more expensive rental homes.

So, even though more low cost rental homes are likely to suffer from draughts than higher cost homes, many higher cost homes also suffer from draughts. This affects the comfort and the energy efficiency of the homes.

Passive solar heating and cooling

In addition to its thermal envelope, the following audited factors influence the passive solar heating and the passive cooling of a house.

- » access to winter sun
- » eaves
- » ventilation
- » thermal mass.

The breakdown of these factors is shown in Tables 38 to 41.

Table 38: Breakdown of houses – window access to winter sun

Window access to winter sun	Number	Per cent
None	12	20%
Partial	13	22%
Yes	34	58%

NOTE: Figures are rounded to the nearest whole number.

Over half of the rental houses have living areas with access to winter sun which potentially could assist with passive heating. Orientation, shading and trees were also considered in the assessment.

Table 39: Breakdown of houses – window orientation of living area

Window orientation	Number	Per cent
North	20	39%
West	9	18%
East	9	18%
South	13	25%

NOTE: Figures are rounded to the nearest whole number.

The orientation of living area windows also affects the need for heating during the colder months. Windows should ideally face north. As 39 per cent of assessed houses face north, it appears that orientation is considered for many houses.

Table 40: Breakdown of houses – eaves existence and extent

Eaves	Number	Per cent
None	3	6%
Insufficient	25	47%
Sufficient	25	47%

NOTE: Figures are rounded to the nearest whole number.

Over half of the rental houses have no eaves or insufficiently sized eaves, which increases the risk of overheating of the house in summer. This assessment was undertaken by the auditors and the results applied to the whole house.

External protection on windows, such as external blinds, shutters or shading assists in reducing external heat gains. External protection on living area window was recorded for over half of the sample of houses. This data reveals that half of the houses have no external protection and of these, two-thirds have unprotected north or west facing windows. Of those with external protection, the protection generally covers all of the living area windows.

Table 41: Breakdown of houses – ventilation

Access to ventilation	Number	Per cent
None	14	28%
Partial	1	4%
Yes, access	33	68%

NOTE: Figures are rounded to the nearest whole number.

About two-thirds of homes have access to ventilation, which auditor comments suggest is usually gained from opening windows and doors.

The thermal mass of a house generally comes from having a cement slab floor. As reported in Table 34 page 27, at least one quarter of rental homes have a concrete slab, which could potentially be used for passive heating or cooling.

Major appliances

Major appliances affecting energy use in the home are the space heating/cooling appliances and hot water systems.

Heating

Table 42 details the heating used in the sample houses below. Note that 15 per cent of homes have a second source of heating and none were recorded as having no heater.

Table 42: Breakdown of houses – main heater

Main heater	Fuel type	Number	Per cent
Central/ducted heater	Gas	18	32%
Space heaters (55%)	Gas	22	38%
	Electric	7	12%
	Unknown	3	5%
Split-system	Electric	4	7%
Portable heater	Electric	2	4%
Fireplace	Wood	1	2%

NOTE: Some households may have more than one source of heating. Figures are rounded to the nearest whole number.

Space heaters are used for the majority of homes, with the heater usually in the lounge or main living room. Gas heating is used in 70 per cent of the rental houses examined for both space and central heating. Electricity is used by most of the remaining homes.

Other audit findings are:

- » Of the 18 central heating systems, only five have zoning controls (all manual).
- » The majority of heaters are described as being in good or excellent condition, with only 9 per cent described as being in poor condition.
- » Three heaters do not work.

Space heaters vary in how economical they are for households to operate. Gas space heating and split-systems are generally considered to be more economical to operate. As a general rule, the more expensive types of heating are likely to be:

- » Electric heaters (both portable and fixed space heater), used by 16 per cent of households.
- » Central heaters (without zoning), used by 23 per cent of households.

Therefore, 39 per cent of the rental houses are using potentially expensive heating in their homes.

Air conditioning

Slightly less than half of the rental houses (47 per cent) have air conditioning and the breakdown of the air conditioning systems by house numbers is shown in Table 43.

Table 43: Breakdown of houses – air conditioner

Air conditioning system	Number	Per cent
Evaporative	8	13%
Evaporative – portable	3	5%
Split-system	12	20%
Wall unit – refrigerative or reverse-cycle	5	8%

NOTE: Figures are rounded to the nearest whole number.

There are some slight differences in the use of air conditioners in the audit sample versus the ABS survey, see Table 8 page 12, as the ABS reports that 22 per cent use evaporative systems compared to 18 per cent in the audits. A couple of the systems are reported to be in poor condition with the rest reported to be in good condition.

In addition, 10 per cent of houses report having ceiling fans, with the majority of these being in homes without air conditioning. Tenants own portable fans in 28 per cent of dwellings.

Hot water systems

The breakdown of the hot water systems by house numbers is shown in Table 44.

Table 44: Breakdown of houses – hot water system

Hot water system	Number	Per cent
Instantaneous gas	8	13%
Storage gas	36	60%
Storage electric	16	26%

NOTE: Figures are rounded to the nearest whole number.

Some of the other findings regarding the hot water systems are:

- » 73 per cent of hot water systems are gas systems.
- » One solar hot water system, gas boosted, was recorded (representing 2 per cent of the audited houses).
- » Hot water system capacities ranged from 50-litre 'under bench' models to 250-litre.
- » Around one-third of the electric systems (five of the 16) operate on a general tariff while the rest are off-peak.
- » 5 per cent of hot water systems are in poor condition and an additional one had a leaking hot water unit relief valve.
- » Pipe lagging is installed on 27 per cent of hot water systems, but is required on 63 per cent of the hot water systems.

The proportion of audited homes using gas hot water systems is higher than the ABS survey revealed, 73 per cent compared to 60 per cent in the ABS survey, see Table 6 page 11.

Regarding the age of the hot water systems:

- » the mean age is 12 years
- » over half were ten years old or less
- » 20 per cent were 15 years or more old and 10 per cent over 30 years old, with some of the older systems in poor condition.

Rental costs and appliance types

The relationship between rental costs and the different types of main appliances was examined to see if low rent housing was associated with appliances that were more expensive to operate.

The houses were divided into the four rental cost bands, presented in Table 29 page 25, and the type of appliances used in each rental band compared. The analysis revealed:

- » Lower cost rental housing has a similar proportion of homes with electric heating as higher cost homes.
- » There are fewer central heaters in the lower cost housing, but this may reflect the fact that the lower cost homes tend to be smaller homes and have less need for central heating.
- » No relationship between rental costs and the presence of air conditioning or type of air conditioning is found.
- » Rental housing costs do not seem to be related to the use of electric hot water systems.

The implication is that the audit results do not support the proposition that lower cost rental homes are less comfortable due to the installation of particular major appliances, or that their appliances make these homes more expensive to operate than comparable higher rent homes. Also, the proportion of rental homes without adequate insulation does not appear to be related to rental costs, as previously reported on page 28. In combination these results do not provide evidence that suggests that the thermal comfort and energy efficiency of a home is greatly related to the rental cost of the home.

The only exception to this finding is that lower cost rental homes tend to have more draughts.



	CFL	Incandescent	Halogen	Linear fluorescent	Total lights	Average lights
Entrance	11	17	1	3	32	1.7
Hall	18	38	15	0	71	1.9
Lounge	44	51	40	3	138	3.0
Kitchen	32	22	16	66	136	2.8
Bedroom 1	30	25	6	0	61	1.3
Bedroom 2	23	20	4	0	47	1.2
Bedroom 3	12	13	2	0	27	1.2
Study	1	20	2	0	23	1.9
Other	21	34	11	3	69	1.4
External	18	44	0	11	73	1.5
Total households	210	284	97	86	677	14.1
Average	4.375	5.9	2.0	1.8	14.1	

NOTE: Figures are rounded to the nearest whole number.

Lighting

The availability of natural light was determined and in about one-quarter of the homes the natural light available was rated as poor.

The types and number of lights installed in the homes was recorded and the data revealed that the average installed lighting per house was 14 lights. The breakdown of lighting by type is displayed in the Table 45 and is based on the audit results for 48 houses.

The results indicate that for the rental homes audited:

- » Incandescent lights remain the most widely installed, with compact fluorescent lamps (CFL) following.
- » Incandescent lights and CFLs are used throughout the house.
- » Halogen lamps are more common in halls, lounges and kitchens.
- » Linear fluorescent lights are used mainly in kitchens and as external lights.

There is considerable potential for the efficiency of the lighting in rental housing to be improved, with the easiest improvement being the continued conversion to CFLs.

Stoves and non-fixed appliances

The audits collected information on stoves, ovens, cook-tops and non-fixed appliances. Analysing and reporting this information was beyond the scope of the present report, but information was supplied to the Department of Sustainability and Environment on the following appliances:

- » stoves, ovens and cook-tops
- » dishwashers
- » microwave ovens
- » range hoods
- » small kitchen appliances
- » televisions
- » cable TV and set-top boxes
- » sound systems
- » VCR/DVD/CD players
- » games consoles
- » computers and peripherals
- » fridges and freezers
- » clothes washers and dryers
- » exhaust fans
- » bathroom heaters
- » portable heaters
- » portable fans.

Water efficiency

Showers

Information was collected on the shower heads of 52 homes revealing the following:

- » There are 62 showers in the 52 homes.
- » 26 of the homes (42 per cent) have low-flow shower heads, i.e. with a flow rate of 9 litres per minute or less.
- » The average flow rate of all showers is 14.1 litres per minute, but is 6.7 litres for the low-flow showers and 16.1 litres for the remaining showers.

There is considerable potential to reduce the water consumption and energy bills of the 58 per cent of rental homes with the higher flow shower heads.

Toilets

The presence of dual-flush toilets was audited in 51 homes revealing that 41 homes (80 per cent) have dual-flush toilets. This implies that a further 20 per cent could improve water savings with the installation of dual-flush toilets.

Kitchen tap flow rates

Kitchen tap flow rates were recorded for 48 homes. The average flow rate is 20.3 litres per minute. Tap aerators are present in 25 kitchens, or approximately half of the homes.

Rain water tanks

Only three houses have rain water tanks installed. These are a small (approximately 90-litre) system, a 1000-litre system and no details were recorded for the third system. All three are used for garden watering and are not plumbed into the house.

Retrofit potential

The following observations were made regarding potential retrofit actions of those homes examined:

Ceiling insulation

- » Between 36 and 50 per cent of the audited houses require ceiling insulation (depending on the presence of insulation in the homes where insulation could not be observed or was not audited).
- » A further 20 to 27 per cent require a top up of their existing insulation.
- » Around 15 per cent of houses appear to have limited roof space access, which may restrict the feasible installation of insulation.

Hot water systems

- » Around 60 per cent of the audited houses require pipe insulation, as only 27 per cent of the hot water systems have lagging.
- » At least 30 per cent of hot water systems are beyond normal operating age (15-20 years) suggesting landlords could respond well to a replacement program encouraging the installation of more efficient hot water systems.

Solar hot water option

- » Of those houses where there information was collected, the roof access to solar radiation varied. 38 per cent of houses have access all day, 46 per cent have access around midday and 16 per cent have access in the afternoon.
- » This suggests that at least 38 per cent of houses should have enough solar access to connect solar hot water systems, but whether access is sufficient for the other houses requires more detailed data collection.
- » The wet areas of around 70% of the audited homes are close to any potential solar hot water systems.

Conversion of appliances to gas

- » Almost all metropolitan homes have access to gas, with around 85 per cent already connected. 10 per cent of which are apartments/flats with gas to within the property boundary. Access to gas is unclear in 5 per cent of the houses.
- » Approximately 20 per cent of rental properties could potentially convert their electric heaters or hot water systems to gas.
- » In 10 per cent of homes gas is not used by one major appliance (the heater or hot water system) despite being connected and used for the other major appliance. Conversion of the second appliance to gas should be easily possible.
- » Only in one home is there any apparent barrier to replacing the electric heating and hot water system, due to lack of external walls for mounting the appliance or flue access.

Draught proofing

- » There is a medium to high requirement for draught proofing in 54 per cent of the dwellings.
- » Draught preventions include door surrounds, window casings, door bottom gaps, window panes, exhaust fans and external wall vents.

Water efficiency

- » There is the potential to install low-flow shower heads in approximately 60 per cent of homes.
- » Around 20 per cent of homes could save water by installing dual-flush toilets.
- » Around 50 per cent of homes could benefit from installing low-flow water aerators in kitchens.

The auditors noted no special barriers to retrofits for any of the homes, such as lack of access or housing being in too poor condition.

2009 Audits: Conclusions

The audit survey results revealed:

- » The rental homes audited have reasonably similar characteristics to the state population of rental dwellings, suggesting the survey results give a reasonable indication of the state of rental housing in Victoria. However, given the small sample size, the audit sample is not statistically representative on all the dimensions that affect rental housing conditions.
- » The audit survey supported the key energy efficiency issue identified by previous surveys: the effective lack of ceiling insulation, which may affect around 30 to 50 per cent of rental homes. In addition, the audit information on the thickness of ceiling insulation reveals that a further approximately 25 per cent of homes in this study would benefit from topping up their ceiling insulation.
- » Approximately 20 per cent of the households audited have electric heaters or hot water systems, which could be converted to gas, reducing greenhouse emissions and (usually) lowering household energy costs. For 10 per cent of households, one major appliance is already on gas so the second could be more easily converted.

- » The majority of homes could be converted to solar hot water and do not have physical barriers preventing such conversions.
- » The majority of households would benefit from draught proofing. The majority have a medium or high level of draught prevention required.
- » Water efficiency gains through low cost measures, such as installing low-flow shower heads and tap aerators in kitchens, would be possible in around half of the homes audited.

Conducting the audit of rental homes has also provided some useful experiences and learning about conducting such audit surveys, including:

- » Considerable lead time is required to successfully recruit households and book audits. Ideally several weeks minimum is required for recruiting households, with the booking and conducting of audits requiring several more weeks (times will vary depending on the number of audits conducted).
- » There were variations in how comprehensively the audit data was recorded across houses and across auditors. The vast majority of data was collected for all houses but in some cases data was missing. For the Mildura houses, this was due to a slightly different audit survey being used, but in other cases it appears to result from differences in the data recording methods of the different auditors. For example, some auditors would leave a record blank if a feature was not present, while others would record the feature as absent. This indicates the importance of ensuring all auditors are trained in the data recording processes and, ideally, an electronic audit survey should be used that does not permit the inputting of blank or non-conforming responses.

Appendix A: Audit Surveys

The energy audits were undertaken by four trained auditors using an energy audit and demographic survey developed to meet the Department's requirements.

The times taken to complete these audits varied, but averaged approximately three hours each. The breakdown of the time is presented in the following table.

Audit Task	Time to undertake
Travel	1 hour
On-site audit	1.5 to 2 hours
Client booking and demographic survey	0.5 to 1 hour
Data entry	0.5 hour

The times include some allowance for householders not being home when the audit was booked, which resulted in additional auditor time spent in travel, attending the site and re-booking time. The average three hours per audit does not include time spent on project management, household recruitment, audit tool development or data analysis.

The cost per audit is in the range of \$315 to \$405, based on \$90 per hour (ex GST).

Auditors were asked to use their discretion when recording the condition of items and appliances, so there is some variation between auditors. However, the auditors were given the following definitions as a guide:

- » Good – not requiring attention
- » Fair – in between
- » Poor – requiring attention.

The auditors focused mainly on the living areas when assessing draughts, the availability of natural light, ventilation, the orientation of windows and the presence of window protection.

A copy of the audit survey forms are presented in the following pages.

DSE audit sheet

Personal details			
Participant's name	name	Surname	
Contact	phone	mobile	e-mail
Preferred contact – method		Preferred contact hours	
Reminder method – day prior	SMS – phone – mobile		
Property type	House – flat – unit		
Address	###	Street	
	Suburb	Post code	
Access to electricity bills –	Yes No		
Electricity retailer	Retailer	Supply ID – MNI, number	
Access to gas bills –	Yes No		
Gas retailer	Retailer	Supply ID – MIRN, number	
Access to water bills –	Yes No		
Water retailer	Retailer	Supply ID – ****, number	
Auditor		Travel time	
Audit date and time	Date	Time in	Time out
		Meter read	
		Photo of house?	Yes No



Conversational points

How long has the tenant lived at the property?

Numbers and approximate ages of the people living in the house.

Does the house get good natural light – or do you switch lights on early?

Final comments and barriers to audit

Site details	
Material type	Brick veneer Double brick Double brick/Concrete block/Stone Fibro Mixture Rammed earth Timber Weatherboard Other... Specify
Building age	Pre 1950 / 1950s / 1960s / 1970s / 1980s / 1990s / Post 2000
Residence size (including any extensions)	Compact < 100m ² – Small 100-149m ² – Medium 150-249m ² Large 250-350m ² – Spacious > 350m ²
Residence type	Apartment – Unit/Flat – multi- storey – Apartment – Unit/Flat – single storey House complex – House detached – House semi-detached
Building description	Single story – Double story –
Adjoining buildings	Above – Below – North – South – East – West
Window frame material – general observation	Timber – Aluminium – Other... Specify
Floor type	Concrete slab – Suspended timber – Mixed – Other...
Roof type	Metal – Ceramic tiles – Slate – Timber – Concrete – Mixed – Other...
Roof construction	Hip – Hip and Gable – Hip and Dutch Gable – Skillion – Butterfly – Flat
Roof colour	Light – Intermediate – Dark – Unknown
Eaves	Sufficient – insufficient – none
External thermal mass/driveways etc.	Percentage of hard surface around house
Floors/storeys	
Number of bathrooms	
Number of living rooms	
Number of bedrooms	
Number of offices	
Number of utility rooms	
Gas connection	Yes No

Site details – additional extensions	
Position	...Ground level ...Upstairs
Description	Extension Bungalow Granny flat
Age	Pre 1950 / 1950s / 1960s / 1970s / 1980s / 1990s / Post 2000
Extension size	Compact-< 100m ² – Small 100-149m ² – Medium 150-249m ² Large 250-350m ² – Spacious > 350m ²
If different from main building material type	Brick veneer Double brick Double brick/Concrete block/Stone Fibro Mixture Rammed earth Timber Weatherboard Other...
Window frame material – general observation	Timber – Aluminium – Other... Specify
Floor type	Concrete slab – Suspended timber – Mixed – Other...
Roof type	Metal – Ceramic tiles – Slate – Timber – Concrete – Mixed – Other...
Roof construction	Hip – Hip and Gable – Hip and Dutch Gable – Skillion – Butterfly – Flat

Other				
Caravans	Sleeping	Cooking	Living	
Shed	Workshop	Sleeping	Cooking	Living
Garage	Workshop	Sleeping	Cooking	Living
Workshop	Workshop used often/occasional/high power equipment/3 phase			
Pool/Spa				

Main living area				
Description				
Orientation of windows				
Windows access winter sun	Yes	No	Partial	Obstructed (describe)
Area of windows by aspect (m ²)	Nth	Sth	East	West
Windows with internal protection	Number with		Number without	
Windows with external protection	Number with		Number without	
Floor coverings main living area	Carpets – Rugs – Tiles – Vinyl – Timber Veneer – Bare – Other...			
Access to ventilation (can access south – north air flow)	Yes	No	Partial	
Use of ventilation	Yes	No	comment	
Draughts	Ceiling architraves – Windows casing – Window guides – Window panes – Louvre windows – Doors surrounds – Door below – Floors – Existing wall vents – Exhaust fans			
Other rooms which are also frequently used?	Describe			

Insulation	
Location of insulation installed (tenants view)	Ceiling – Floor – Wall
Location of viewed insulation	Ceiling – Floor – Wall
Type of existing ceiling insulation	Glass wool – Rock wool – Polyester – Sheep's wool – Cellulose fibre – Core-fill – Seaweed – Other (describe)
Thickness of ceiling insulation	Nil <30 <60 <90 <120 <150 <180 <210 >210 actual
Type and thickness of viewed floor or wall insulation	Where Type Type Thickness Where
Other housing insulation on site	Double glazed windows – Window tinting – Window awnings – Draft stoppers on doors – A skylight – Curtains – Reflective paint
Windows overall with internal window protection	All Most Some Nil Describe
Windows overall with external window protection	All Most Some Nil Describe

Water	
Showerhead count	Number Litres per minute
Low flow shower head count	Number WELS rating
Flow rate at kitchen	Litres per minutes
Aerator count	
Dual flush toilet	Yes No WELS rating
Rainwater tank connection	Pump Volume Laundry Toilet Other – specify

Retrofit options				
Fuse board condition	Photo	Old	New	Safety switches
Access to roof	Yes	No	Comment	
Access to roof space	Yes	No	Comment	
Hot water tank insulation required	Yes	No		
Pipe insulation required	Yes	No	Length of accessible pipe in need of insulation	
Roof access to solar radiation for solar HWS	Morning	Midday	Afternoon	
Proximity of potential solar HWS to wet areas	Close	Far	Both close and far	
Access to Gas for gas space heating and/or hot water	Connected to dwelling		Individually metered	
	Pipe size	1/2"	3/8"	1"
	Within boundary			
	Neither	Available in street		
External position available for gas HWS (flats & apartments only)	Yes	No	Potential barriers	
External wall available for placing flued gas heater (where house has no fixed heating)	Yes	No	Potential barriers	
Types of draught sealing required throughout house	Ceiling architraves – Windows casing – Window guides – Window panes – Louvre windows – Doors surrounds – Door below – Floors – Existing wall vents – Exhaust fans			
Level of draught sealing required	High	Medium	Low	
Vehicle access to property	Street access		Drive way access –	
Hazards	Dogs – Asbestos – Un vented heaters			

Comments							
Appliances – heating	Fixed asset				Portable		
Appliance type							
Appliance count	Total number	Total number	Total number	Total number	Total number	Total number	Total number
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Space	Central	Split system	Fireplace			
Usage, average winter use	usage	usage	usage	usage	usage	usage	usage
Operating temperature range	Temp tenant sets thermostat						
Location (space or portable)	Location	Location	Location	Location	Location		
If central	Hydronic/Ceiling/Floor						
Rooms ducted	bedrooms	Living room	Kitchen	Bathroom	Laundry		
Electronic zoning	Yes No	Tenant does zone					
Manual zoning	Yes No	Tenant does zone					
Manufacturer	Make	Make	Make	Make			
Model number	Model number	Model number	Model number	Model number			
Fuel type	Electric	Gas	Oil	Wood			
Appliance size/capacity/power	kW	kW	kW	kW			
Energy rating	star rating	star rating	star rating	star rating			
standby power	Yes No	Yes No	Yes No				
Age	age	age	age	age			age
Condition	Working – good poor	condition	Working – good poor	condition			condition
Comment							

Laundry and bathroom							
Appliance type	Clothes washer	Clothes dryer	Drying cabinet		Exhaust fan	Bathroom heating devices	
Appliance count	Total number		Total number		Total number	Total number	Total number
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Top Front						
Location	Location	Location	Location	Location	Location	Location	Location
Usage, average weekly	loads	loads	usage	usage	usage	usage	usage
Manufacturer	Make	Make	Make	Make	Make	Make	Make
Model number	Model number	Model number	Model number	Model number	Model number	Model number	Model number
Fuel type	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Appliance size/capacity/power	kW	kW	kW	kW	kW	kW	kW
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age	age	age	age	age	age	age	age
Condition	Working – good poor	condition	Working – good poor	condition	Working – good poor	Working – good poor	Working – good poor
Standby power	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Operating temperature range							
Water connection temperature for water-using appliances							
WELS rating							
Comment							

Hot water unit			
Appliance type	HWU	HWU	HWU
Appliance count	number	number	number
Ownership – Landlords/Tenants	L/T	L/T	L/T
Description	Solar storage – electric boost storage – gas storage – electric	Solar with Instant gas boost Instant electric	
Storage capacity			
Location – storage tank Location	Location	Location	Location
Usage, average weekly	Do they routinely turn the unit off		
if they turn the unit off	most days – few times a week		
Mains pressure – gravity fed	Mains – gravity	Mains – gravity	Mains – gravity
Manufacturer	Make	Make	Make
Model number	Model number	Model number	Model number
Fuel type	Electric – Gas		
	Off-peak		
Appliance size/capacity/power	kW	kW	kW
Energy rating	star rating	star rating	star rating
Age	age	age	age
Condition	Working – good poor	Working – good poor	Working – good poor
HWU – relief valve	Working – leaking	Working – leaking	Working – leaking
HWU Vessel			
Standby power			
Operating temperature range			
Comment			

Fridge							
Appliance type	Fridge/ Freezer	Fridge/ Freezer	Fridge/ Freezer	Fridge/ Freezer	Fridge/ Freezer	Fridge/ Freezer	Fridge/ Freezer
Appliance count	Total number						
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Fridge/ Freezer	Fridge no freezer	Fridge no freezer	Chest freezer			
Location	Kitchen	other	other	other	other	other	other
Usage	On/off/on but rarely used						
Coil ventilation	good	ok	bad				
Position – next to heat sources	Hot room	Sun	Boxed in				
In use	Yes –	No –	No but on				
Manufacturer	Make	Make	Make				
Model number	Model number	Model number	Model number				
Fuel type	Electric	Gas					
Appliance size/capacity/power	kW	kJ					
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age	age	age	age	age	age	age	age
Condition of seals	Seals	Seals	Seals	Seals	Seals	Seals	Seals
Condition of coils	Door	Door	Door	Door	Door	Door	Door
Comment							

Kitchen – general							
Appliance type	Stove oven	Stove top	Oven	Dish washer	Microwave	Microwave	Range hood
Appliance count	Total number	Total number	Total number				
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Fan forced				Convection		
Location	Kitchen	Kitchen	Kitchen	Kitchen	Kitchen		
Usage, average weekly	usage	usage	usage	usage	usage	usage	usage
Manufacturer	Make	Make	Make	Make	Make	Make	Make
Model number	Model number	Model number	Model number	Model number	Model number	Model number	Model number
Fuel type	Electric/ Gas	Electric/ Gas	Electric/ Gas	Electric/ Gas	Electric/ Gas	Electric	Electric
Appliance size/capacity/power	kW/J	kW/J	kW/J	kW/J	kW/J	kW	kW
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age				age			age
Condition	condition	condition	condition	condition	condition	condition	condition
Standby power (p.a.)	clock	timer	Yes No	Yes No	Yes No	Yes No	Yes No
Water connection temperature for water-using appliances				Hot/Cold – Both			Hot/Cold
WELS rating							Water rating
Comment							
In general use	Exhaust fan venting into – ceiling – through window Frying pan – Wok – Kettle – Blenders – Coffee perk – Toaster – sandwich toaster – elec grill –						

Appliances – cooling							
Appliance type	Air-conditioner	Air-conditioner	Air-conditioner	Air-conditioner	Ceiling fan	Portable fan	Portable fan
Appliance count	Total number	Total number	Total number				
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Split system	Wall	Ducted evap	Ducted refrig	Reversible		
Location	Location	Location	Location	Location	Location	Location	Location
Usage, average summer use	usage	usage	usage	usage	usage	usage	usage
Ducted	Ceiling/ Floor	Ceiling/ Floor	Ceiling/ Floor				
Zoning (Heating & AC)	Zoning	Zoning	Zoning	Zoning			
Manufacturer	Make	Make	Make	Make	Make	Make	Make
Model number	Model number	Model number	Model number	Model number	Model number	Model number	Model number
Fuel type	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Appliance size/capacity/power	kW	kW	kW	kW	kW	kW	kW
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age	age	age	age	age	age	age	age
Condition	Working – good poor	Working – good poor	Working – good poor	condition	condition	condition	condition
Standby power	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Operating temperature range							
Water connection temperature for water-using appliances							
WELS rating							
Comment							

Appliances – TV & accessories							
Appliance type	Television	Cable TV (Set-top) Box	Additional Sound system	VCR/ DVD/CD Player			
Appliance count	Total number	Total number	Total number	Total number	Total number	Total number	Total number
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description main	Plasma LCD CRT		Location				
Description others	Plasma LCD CRT						
Location main	Location	Location	Make	Location	Location	Location	Location
Location others							
Usage, average weekly	usage	usage	Yes No	usage	usage	usage	usage
Manufacturer	Make	Make	Model number	Make	Make	Make	Make
Model number	Model number	Model number	Electric	Model number	Model number	Model number	Model number
Fuel type	Electric	Electric	kW	Electric	Electric	Electric	Electric
Appliance size/capacity/power	kW	kW	number	kW	kW	kW	kW
Energy rating	star rating	star rating	age	star rating	star rating	star rating	star rating
Age	age	age	Working – good poor	age	age	age	age
Condition	Working – good poor	Working – good poor	usage	Working – good poor	Working – good poor	Working – good poor	Working – good poor
Standby power	Yes No	Yes No		Yes No	Yes No	Yes No	Yes No
Comment							

Computers and office equipment							
Appliance type	Computer	Computer	Computer				
Appliance count	Total number	Total number	Total number	Total number	Total number		
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description	Desktop	Desktop	Desktop				
	Laptop	Laptop	Laptop				
Monitor description	Desktops only	Desktops only	Desktops only				
	LCD – CRT	LCD – CRT	LCD – CRT				
Peripherals/ADSL – Modem	Y N – Std by power						
Printer	Y N – Std by power						
Location	Location	Location	Location	Location	Location	Location	Location
Usage, average weekly	usage	usage	usage	usage	usage	usage	usage
Manufacturer	Make	Make	Make	Make	Make	Make	Make
Model number	Model number	Model number	Model number	Model number	Model number	Model number	Model number
Fuel type	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Appliance size/capacity/power	kW	kW	kW	kW	kW	kW	kW
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age	age	age	age	age	age	age	age
Condition	Working – good poor	Working – good poor	Working – good poor	condition	Working – good poor	condition	condition
Standby power	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Comment							

Audio							
Appliance type	Hi Fi – Radio	Hi Fi – Radio	Hi Fi – Radio	Hi Fi – Radio	Hi Fi – Radio	Hi Fi – Radio	
Appliance count	Total number	Total number	Total number				
Ownership – Landlords/Tenants	L/T	L/T	L/T	L/T	L/T	L/T	L/T
Description							
Location	Location	Location	Location	Location	Location	Location	Location
Usage, average weekly	usage	usage	usage	usage	usage	usage	usage
Manufacturer	Make	Make	Make	Make	Make	Make	Make
Model number	Model number	Model number	Model number	Model number	Model number	Model number	Model number
Fuel type	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Appliance size/capacity/power	kW	kW	kW	kW	kW	kW	kW
Energy rating	star rating	star rating	star rating	star rating	star rating	star rating	star rating
Age	age	age	age	age	age	age	age
Condition	Working – good poor	Working – good poor	Working – good poor	condition	Working – good poor	condition	condition
Standby power	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Comment							

Lighting										
Location	Entrance	Hall	Lounge	Kitchen	Bd Rm 1	Bd Rm 2	Bd Rm 3	Study		External
CFL count	number	number	number	number	number	number	number	number	number	number
25W incandescent count	number	number	number	number	number	number	number	number	number	number
40W incandescent count	number	number	number	number	number	number	number	number	number	number
60W incandescent count	number	number	number	number	number	number	number	number	number	number
75W incandescent count	number	number	number	number	number	number	number	number	number	number
100W incandescent count	number	number	number	number	number	number	number	number	number	number
Halogen down light count	number	number	number	number	number	number	number	number	number	number
Halogen down light wattage	number	number	number	number	number	number	number	number	number	number
Linear fluorescent count	number	number	number	number	number	number	number	number	number	number
Linear fluorescent wattage	number	number	number	number	number	number	number	number	number	number
other (record no and wattage)										

Appendix B: Demographic survey

DSE renters project demographic survey

Name

Address

Record gender

Male

Female

1. Just to confirm, do you rent your home?

Yes

No (ineligible for audit at this time, do not book in the audit.)

2. Do you pay the rent for the property that you live in through an agent or directly to the landlord?

Through an agent

Directly to the landlord

Don't Know

3. Approximately how much is the rent for the property that you live in?

Per week or

Per fortnight or

Per month

Refused

4. Does anyone in your household have a Commonwealth Concession Card?

Yes

No (Go to question 6)

Don't Know

5. Which Concession card do they have?

- Centrelink Pensioner Concession Card
- Veterans Affairs Pensioner Concession Card
- Health Care Card
- Veterans Affairs Gold Card (War Widow, TPI, except dependant)
- Don't know

6. How many people in the following age groups live in your household?

- 0-5 _____
- 6-9 _____
- 10-17 _____
- 18-24 _____
- 25-34 _____
- 35-44 _____
- 45-55 _____
- 56-64 _____
- 65-74 _____
- 75+ _____

7. Households that are at home more tend to use more energy than those that are away from home more. During the week is there someone at home during the day:

- All of the time
- Often
- Some of the time
- Rarely or never

8. How many weeks of the year is your house occupied approximately? _____

9. Over the past year, how easy or difficult has it been for you to find the money to pay for electricity, gas, water and other fuel?

Very easy

Somewhat easy

Neither easy nor difficult

Somewhat difficult

Very difficult

10. Do you have difficulties in keeping your dwelling at a comfortable temperature during the colder months?

Yes

No

Unsure

11. Do you have difficulties in keeping your dwelling at a comfortable temperature during the warmer months?

Yes

No

Unsure

12. What is your **total household** income?

Per week or

Per fortnight or

Per year

Refused

Don't Know

12a) Is that amount before or after tax is taken out?

Before tax

After tax

www.dse.vic.gov.au

