The power to save

An equity assessment of the Victorian Energy Saver Incentive in metropolitan Melbourne

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Working for an Australia free of poverty

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Abbreviations

VESI	(Victorian) Energy Saver Incentive	Also known as the Victorian Energy Efficiency Target Scheme
VEEC	Victorian Energy Efficiency Certificate	A certificate created in the VEET scheme which represents one Mt CO2-e of emissions reduction
VEET scheme	Victorian Energy Efficiency Target scheme	Operates as the Energy Saver Incentive

Units of measurement

CO2-e	Carbon dioxide equivalent
Mt CO2-e	Mega (million) tonnes of carbon dioxide equivalent greenhouse gas

Summary

The Energy Saver Incentive (VESI[1]), also known as the Victorian Energy Efficiency Target (VEET) scheme, is the largest residential greenhouse gas emissions reduction scheme in Victoria. In Phase 1, it required energy retailers to fund emissions reductions by purchasing certificates created by accredited operators making energy efficiency improvements in homes. Accredited activities included replacement of light globes and upgrading of hot water services. This report presents the results of our equity analysis of the impacts of the scheme in metropolitan Melbourne and shows the extent to which savings are being achieved in relatively disadvantaged and advantaged areas.

As energy prices increase, VESI presents a significant opportunity for Victorian households to reduce their greenhouse gas emissions and their exposure to rising energy prices. It is, however, crucial that more disadvantaged households are treated equitably and that they have the opportunity to participate fully in VESI. According to recent modelling, households that implement measures covered by the scheme will end up reducing their energy bills by more than those that do not (DPI 2011b, p.52). VESI operates across the state, but our analysis was limited to metropolitan Melbourne. We investigated the distribution of improvements, and hence of potential savings, across more advantaged and disadvantaged areas of the city.

Analysis of the 2009–11 phase of the VESI in metropolitan Melbourne produced mixed results:

- Relatively disadvantaged areas have received a greater share of the total VESI benefits, measured by Victorian Energy Efficiency Certificates (VEECs), than more advantaged areas.
- The higher rate of VEECs created in disadvantaged areas reflects the high proportion of VEECs created through replacement light globes, primarily compact fluorescents (CFLs), and replacement high efficiency showerheads.
- Disadvantaged areas have received fewer of the measures which cost more to install and result in higher energy efficiency returns, such as hot water services, space heating and insulation.
- Relatively advantaged areas have received more of these high-value, high-return measures including hot water service replacements. These items generate markedly higher savings per household than the low-cost measures but are likely to involve a householder co-contribution.

These results have important implications for the scheme in the future.

In particular, as the scope for light globe and showerhead replacements is exhausted, low-income households are likely to receive less benefit from the scheme, relative to other households. This is largely because such households are unable to afford the co-contributions required for measures that are more expensive.

Recommendations

The following recommendations are designed to improve the VESI scheme. If they are implemented, all Victorian households will have more opportunity to implement energy efficiency measures and share in the benefits from the VEET scheme.

[1] We refer to Victoria's Energy Saver Incentive (ESI) as the VESI to distinguish it from other energy savings initiatives including the proposed National Energy Savings Initiative (NESI).

To address the up-front capital barrier to higher cost energy efficiency measures such as upgrading hot water services, the Victorian Government should:

1. Introduce additional financial incentives for low-income households to access higher value measures. This could be achieved by expanding Sustainability Victoria's rebates targeted at measures which present a substantial capital barrier, such as hot water and heating.

2. Investigate the viability of on-bill financing and low-interest loans as potentially affordable credit mechanisms to assist low-income households to access higher cost energy efficiency upgrades.

To foster equitable outcomes for the VESI scheme across different socioeconomic groups, the Victorian Government should:

3. Conduct and publish annual surveys of the geographic distribution of VESI residential energy efficiency measures in relation to socioeconomic disadvantage. The analysis should include the distribution of specific measures (such as hot water service upgrades).

4. Develop data collection and release processes that improve opportunities to assess program impacts.

5. Investigate the effectiveness of specific targets for disadvantaged households participating in the scheme, similar to the priority group and fuel poverty target in the United Kingdom's Carbon Emission Reduction Target Scheme.

To maximise the overall effectiveness of the scheme, and the benefits for individual households, the Victorian Government should:

6. Introduce an additional financial incentive for providers that deliver multiple retrofit measures in one house.

In addition, the Victorian Government should:

7. Develop programs that involve landlords in the scheme. These might include information for landlords and programs to assist tenants gaining consent from landlords.

8. Promote greater links between the VESI scheme and other residential energy efficiency programs.

The results of this study also have implications for the proposed National Energy Savings Initiative (DCCEE & DRET 2011). The Australian Government should incorporate these recommended improvements in their design for that scheme.

1 Introduction

The Victorian Energy Saver Incentive (VESI) is the largest residential energy efficiency incentive in Victoria. It is designed to improve the energy efficiency of tens of thousands of Victorian homes. Ideally, all Victorian households should benefit from lower energy bills as a result of the scheme. Those households that participate directly in the scheme by installing subsidised energy efficiency measures will receive additional benefits. At the lower end of the scale, participating households may receive free light globes; at the higher end, households may receive incentives worth hundreds of dollars for the installation of a solar hot water system[2]. Many of the high-end measures will lead to significant reductions in household energy bills, as well as to greenhouse gas savings.

Understanding the extent to which the benefits of the scheme are shared across all sections of the community is therefore important. Until now, no such analysis has been undertaken.

This report seeks to address this knowledge gap by identifying whether the benefits flowing from the VESI scheme have been equitably distributed between relatively disadvantaged and more advantaged areas. The scheme operates state-wide, but our analysis is limited to greater Melbourne. It examines the distribution of carbon savings under the scheme in relation to postcode areas as ranked by the Australian Bureau of Statistics' Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD).

2 Background

Victoria's Energy Saver Incentive

The primary objective of the Energy Saver Incentive (referred to in this paper as the VESI), is to reduce Victoria's greenhouse gas emissions by mandating that energy retailers reduce the emissions of their customers.

From its first phase of operation, from 1 January 2009 to 31 December 2011, the scheme is expected to reduce Victorian household emissions by 2.7 million tonnes of carbon dioxide equivalent greenhouse gases (MtC02-e) each year. The emission savings are derived from an estimate of the lifetime emission reductions of the actions undertaken under the scheme. In its second phase, from the start of 2012 until the end of 2014, the obligation on energy retailers will increase, and coverage will also be expanded to include small to medium-sized businesses. In the second phase, the scheme is expected to generate 5.4 MtCO2-e savings per annum. The VESI will continue until 2030, with reviews every three years (ESC 2011e).

Similar schemes exist in other jurisdictions in Australia and overseas: they are often referred to as 'white certificate' schemes. Like other white certificate schemes, the VESI involves the Victorian Government setting a target for greenhouse gas emissions reductions, which is divided between energy retailers in proportion to the amount of energy they sell to consumers. Energy retailers must then create or purchase Victorian Energy Efficiency Certificates (VEECs) equivalent to their emissions reductions target. VEECs are created when an 'accredited person'[3] undertakes an

[2] For example, using one retailer's online quote system, an upgrade from electric hot water storage to solar with gas back-up attracts rebates of up to $2972 from a combination of VEECs and federal government rebates. It incurs an out-of-pocket cost to householders of between $3490 and $3590 (Origin Energy 2011).

[3] 'Accredited persons' refers to 'individuals or companies that have been approved to create Victorian energy efficiency certificates (VEECs)' (ESC 2011c).

approved energy-saving activity in a Victorian home. Different energy-saving activities generate different numbers of VEECs[4]. The number of VEECs for any given activity is based on the average calculated saving from that intervention, referred to as the deemed saving. Each VEEC represents one metric tonne of carbon dioxide equivalent. The certificates can be traded.

The energy efficiency measures approved under the VESI range from low-cost interventions, such as the installation of compact fluorescent light globes, to high-value interventions, such as the installation of a solar hot water service. Businesses can provide approved measures free of charge or with a co-contribution toward the costs of installation from the householder. The more costly the individual measures, the more likely it is that a co-contribution will be required. In Phase 1 of the scheme, replacement light globes and showerheads were regularly provided free of charge to householders.

The costs and benefits of the VESI have been considered on a number of occasions, including most recently in the Regulatory Impact Statement (ACIL Tasman 2011; DPI 2011a, 2011b). The impact of the scheme on householders' electricity bills is particularly important in understanding its equity implications. All households ultimately pay for the direct costs of the VEET scheme through their energy bills, as in Victoria's deregulated energy market the energy retailers are able to pass on the full costs for implementing the scheme to customers. However, economic modelling showed that an emissions reduction target of 5.4 MtCO2-e would lead to a reduction in total energy usage and subsequently a reduction in the average household's electricity bill (ACIL Tasman 2011). ACIL Tasman also commented that the amount of reduction in electricity bills depends on the energy efficiency measures households install under the scheme:

> Although there is a reduction in the average electricity bill for residential customers, the actual variation in electricity bill experienced by any particular customer will depend on their response to the extended ESI scheme. The reduction in electricity bill may be greater for those customers that undertake more energy efficiency activities under the ESI scheme and may be less (or may increase) for those customers that do not undertake any energy efficiency activities (ACIL TASMAN 2011, p. 32).

Equity and white certificate schemes

In this paper, *equity* is used as the basis of our assessment. While the primary objective of the Energy Saver Incentive is to reduce greenhouse gas emission, it is valuable to consider whether the costs and benefits of the scheme are distributed equitably. Culyer (2001, p. 275) suggests equity is (among other definitions) 'distribution that is to the advantage of the least advantaged'. Povleson (2011) defines equity as social justice or fairness, which Miller (in Culyer, p. 280) links to the distribution of resources according to need. Braveman (2003) defines equity (in the context of health) as the 'absence of disparities'. The definition applied in our assessment is the extent to which the benefits of VESI are distributed to the least advantaged.

The benefits from the VESI scheme flow to households in two distinct ways: through system-wide reductions in electricity use and through direct savings from energy efficiency measures that are subsidised by the scheme.

[4] The number of VEECs that a given activity yields depends on the amount of CO2-e abatement that the activity will cause. The abatement is calculated by comparing the difference between (i) the energy use of the new product and (ii) the 'baseline' energy use, which refers to the amount of energy that would have been used if the new-high efficiency product had not been installed (ESC 2011a).

Households that participate by implementing energy efficiency measures will receive both the system-wide reductions in energy bills and any savings from the energy efficiency measures introduced into their homes. DPI (2011b) identified the average benefit for households that take part in the scheme (based on undertaking at least two energy efficiency activities) as $308 saving on their electricity bill over the first five years (assuming an annual household electricity bill of $1104.50, or $5522.50 over five years).

Non-participating households, on the other hand, only receive the benefits from any system-wide reductions in energy bills. Economic modelling of the scheme indicates that it will lead in the longer term to net reductions in electricity consumption, and subsequently reductions in residential electricity bills (DPI 2011b). In the initial years, however, those households that do not receive a direct benefit from efficiency measures may end up paying for the scheme through increased electricity bills. DPI (2011b) estimates the system-wide changes in electricity costs (per MWh) resulting from the scheme. The cumulative electricity savings for a non-participating household is valued at approximately $38.80 between 2012 and 2015 (based on an average household electricity consumption of 4000 kWh per year, in a home with gas hot water and heating). Projected cumulative costs or savings are shown in Table 2.1.

Table 2.1 Projected cumulative energy bill costs or savings for non-participating households

	2012	2013	2014	2015
Cumulative costs or savings per MWh of consumption (positive value indicates a cost; negative value indicates a saving)	$1.80	$0.60	-$0.06	-$9.70
Cumulative costs or savings for an average household	$7.20	$2.40	-$0.24	-$38.80

Sources: Authors' calculation based on price per MWh from ACIL Tasman (2011) and DPI (2011b) and average household energy consumption 4000 kWh for a household with gas hot water and heating from ESC (2011b)

The present analysis of the take-up of the VESI scheme by different income groups will provide a greater understanding of the ways in which low-income households are benefiting.

Measures to ensure social equity in white certificate schemes

A number of white certificate schemes elsewhere have built-in obligations for energy retailers to ensure the benefits are shared equitably. Most commonly this involves requirements that a fixed proportion of the greenhouse gas savings are achieved in specific household types. In the United Kingdom, for example, the final period of the Carbon Emissions Reduction Target scheme (CERT) required that 40 per cent of savings be achieved in a priority group made up of 'vulnerable and low-income households, including those in receipt of eligible benefits and pensioners over the age of 70'. A further target required that 15 per cent of these savings be 'achieved in a subset of low-income households (a super priority group) considered to be at high risk of fuel poverty'5 (DECC 2011).

In Australia, South Australia's Residential Energy Efficiency Scheme (REES) includes a priority group made up of households with a pension concession card or health care card (ESCOSA 2011). By contrast, the VESI has no specific requirements to ensure energy-saving measures in disadvantaged or vulnerable Victorian households.

[5] Fuel poverty is a contested term in Australia. In the UK, it refers to a situation where a household 'needs to spend more than 10 per cent of its income on fuel for adequate heating' (DECC 2011).

3 Methods

Research questions

The aim of this analysis is to understand the distribution of the benefits of the VESI across Melbourne postcode areas identified as relatively disadvantaged or advantaged.

The research was guided by five questions:

- What proportion of VEECs (as measured by the rate of VEEC creations) is created in disadvantaged postcode areas, compared to more-advantaged postcode areas?
- What differences are there in the types of activities undertaken to generate VEECs in disadvantaged postcode areas, compared to more advantaged postcode areas?
- Which postcode areas benefit from VEEC creation through installations that will lead to substantial energy (and energy bill) savings?
- What other differences are there in the distribution of the benefits of VESI activities?
- What could improve access to energy efficiency activities generating VEECs for underserviced households in disadvantaged areas?

These questions were investigated using the VEET activity postcode report data, the ABS Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) and the 2006 Census data for the number of dwellings in each postcode area. These data sets are described below.

The VEET activity postcode report provides the only available data about the households taking part in the scheme. It shows the program activity type (e.g. water heating, insulation, lamps) and the number of installations and number of VEECs created, in each postcode area for Victoria (ESC 2011d). The program currently operates only in residential properties, but a small amount of data pertains to small or medium enterprises that provide accommodation, for example caravan parks and hotels. Postcodes were selected as the geographic unit of analysis because the VEET activities are reported by postcode and not by local government area or other statistical area.

The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) was selected as the most appropriate indicator of disadvantage and advantage for this analysis because it is:

- a continuum from advantage (high values) to disadvantage (low values)
- derived from Census variables related to both advantage and disadvantage
- recommended by the ABS ‘for users who are interested in relative advantage as well as disadvantage’ (ABS 2008).

For this analysis, postcode areas were classified by their IRSAD deciles (ten equal groups in rank order). The deciles were then aggregated into quintiles (five equal groups in rank order) which were named as shown in Table 3.1.

Table 3.1 IRSAD quintile names

IRSAD quintile	Name used in this paper
Quintile 1 – most disadvantaged / least advantaged	Highly disadvantaged
Quintile 2 – less disadvantaged / more advantaged (relative to Q1)	Somewhat disadvantaged
Quintile 3 – mid quintile	Average
Quintile 4 – somewhat advantaged / less disadvantaged (relative to Q3)	Somewhat advantaged
Quintile 5 – most advantaged / least disadvantaged	Highly advantaged

Data matching

For this analysis, three sets of data were matched. The three sets do not have identical time-frames and due to some variables being available in one data set but not others, there was some data loss. While the SEIFA IRSAD data is from 2006, the VEET data is from 1 January 2009 to 1 July 2011. The VEET data was matched to the IRSAD data and the ABS 2006 Census postcode area dwelling structure data. The dwelling structure data includes a small proportion of dwelling types that would be unlikely to receive installations through VEET, such as improvised homes / tents / sleepers out and includes groups listed as 'not applicable' for the VEET such as rooming houses and aged care facilities.[6]

Calculating the VEEC rate

For this analysis, a rate of VEECs per 100 dwellings was calculated. This was done because the number of dwellings in each IRSAD quintile in metropolitan Melbourne is unequal. Initial testing identified the unequal number of dwellings in each IRSAD quintile as skewing the results.

The rate was created by dividing the number of VEECs in the postcode areas aggregated into the IRSAD quintiles by the number of dwellings in the same area. This was then factored up by 100, as the rate per single dwelling was too small to be meaningful (for example, 0.0000843 VEECs per dwelling).

A small number of areas for which a 'number of dwellings' is not available were excluded from the analysis. These account for just over half of one per cent of activities and one per cent of VEECs.

[6] The Essential Services Commission (pers. comm., 2 August 2011) indicate that while the first phase of the scheme targeted residential dwellings, not commercial properties, there were a small number of installations in commercial properties that provided accommodation services (such as motels, boarding houses). Thus some of the 'not applicable' group may have benefited from VEET.

4 Results

This section presents the assessment of the equity impacts of the VESI in metropolitan Melbourne.

VEEC creation in disadvantaged and advantaged areas of Melbourne

Table 4.1 shows the rate of all VEET activities undertaken per 100 households in each of the IRSAD quintiles.

Table 4.1 Rate of VEET activities and VEECs by IRSAD quintile

Quintile	Number of dwellings	Rate of VEET activities per 100 dwellings (N=475,445)	Rate of VEECs per 100 dwellings (N=3,942,963)
Q1 Highly disadvantaged	117,459	57.07	422.59
Q2 Somewhat disadvantaged	54,600	49.00	364.28
Q3 Average	171,950	45.93	375.24
Q4 Somewhat advantaged	404,810	37.21	314.56
Q5 Highly advantaged	622,965	24.41	213.34
Total	**1,371,784**	**34.65**	**287.43**

In the period from 1 January 2009 to 1 July 2011, the overall rate of VEET activity and VEEC creation was highest in households in the most highly disadvantaged postcode areas in Melbourne. This suggests the program is likely to have been successful in achieving emissions reductions in low-income/disadvantaged households. However, when assessing the types of activities undertaken, a somewhat different picture emerges. This is discussed in the following sections.

Frequency of different types of VEET activities

To analyse the impact of various VEET activities, the mean number of VEECs created for each activity was derived. These are listed in rank order in Table 4.2. The mean VEECs per activity provide an indication of those activities that generate higher carbon emissions reduction: the higher the number of VEECs, the larger the emissions reduction. Also, the higher the mean VEECs, the higher the subsidy from the scheme to an individual household is likely to be.

The most common activities in the VESI were replacement of lighting with low-energy (or compact fluorescent) lighting (387,680 activities) and replacement of shower roses (71,987 activities). However, these are some of the lowest-return activities, generating 9.13 and 1.88 VEECs per activity respectively.

Table 4.2 also clearly indicates that by far the greatest energy savings will be made in homes where electric space heating is replaced by a gas system (mean = 153.25 VEECs per activity). This is followed by replacement of electric water heating by a gas-boosted solar system (mean = 60.17), then by ceiling insulation (mean = 49.84). Households that undertake these activities are also expected to receive the largest financial subsidies, mainly reflecting the number of certificates created for each activity.

Table 4.2 Mean VEECs per activity

Activity	Number of activities	Number of VEECs	Mean VEECs created per activity
Water heating			
1A Decommissioning electric resistance water heater and installing gas/LPG storage water heater	710	26,645	37.53
1B Decommissioning electric resistance water heater and installing gas/LPG instantaneous water heater	456	16,534	36.26
1C Decommissioning electric resistance water heater and installing electric-boosted solar or heat pump water heater	1,248	48,265	38.67
1D Decommissioning electric resistance water heater and installing gas/LPG-boosted solar water heater	1,218	70,390	57.79
2 Installing solar retrofit kit on an electric resistance water heater	2	44	22.00
3 Decommissioning gas/LPG water heater and installing gas/LPG-boosted solar water heater	3,269	34,638	10.60
4 Installing solar pre-heater on a gas water heater	3	21	7.00
Space heating			
5 Decommissioning ducted gas heater and installing high-efficiency ducted gas heater	84	1,024	12.19
6 Decommissioning central electric resistance heater and installing high-efficiency ducted gas heater	8	1,226	153.25
9 Installing gas/LPG space heater	71	611	8.61
Insulation and weather sealing			
11 Installing ceiling insulation	688	34,291	49.84
12 Installing under-floor insulation	1	17	17.00
15 Weather sealing (external doors and windows, exhaust fans, ventilation, chimneys and flues)	133	173	1.30
Lights, showerheads, refrigerators			
16 Low-energy lamps	387,680	3,540,698	9.13
17 Decommissioning a non–low flow shower rose and installing a low-flow shower rose	71,987	135,188	1.88
18 Purchase of a high-efficiency fridge/freezer	1	1	1.00
19 Removing and destroying pre-1996 fridge/freezer	7,886	33,197	4.21

Proportion of VEECs created from different activity types

Table 4.3 shows the proportion of emission reductions, as measured by the number of VEECs created in metropolitan Melbourne, for the major energy-saving activity groups. The installation of energy efficient lighting accounts for 90 per cent of all emission reductions, followed by water heating (5 per cent) and shower roses (3 per cent).

Table 4.3 Proportion of total VEEC creation in metropolitan Melbourne by activity group

Activity	Number of VEECs	% of total VEECs created
Lighting	3,540,698	90%
Water heating	196,537	5%
Shower rose	135,188	3%
Insulation and weather sealing	34,481	1%
Removing and destroying pre-1996 refrigerator or freezer*	33,198	1%
Space heating	2,861	<1%
Total	**3,942,963**	**100%**

* Includes one instance of buying a new fridge or freezer

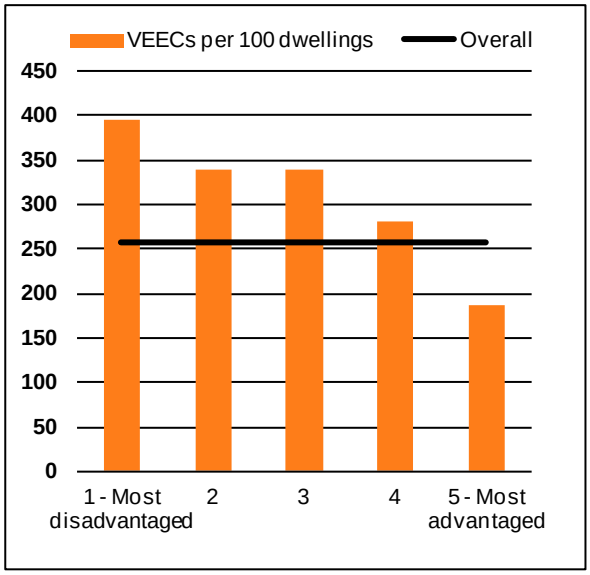
High-prevalence activities

Installing compact fluorescent light globes and low-flow showerheads are the most common activities under the VEET scheme and generate the highest and second highest totals of VEECs respectively. Results of further analysis are presented in the following sections.

Lighting

The 387,680 energy efficient lighting activities represent a total of 3,540,698 VEECs or 90 per cent of all VEEC creation in metropolitan Melbourne. Figure 4.1 shows the rate of VEEC creations per 100 dwellings, by IRSAD quintile.

Figure 4.1 VEECs per 100 dwellings by IRSAD quintile: lighting



For lighting, the overall rate of VEECs per 100 dwellings was 258 (indicated by the horizontal black line in Figure 4.2). However, the rate of VEEC creation was highest in the most disadvantaged quintile (395 per 100 dwellings) and decreased through the middle quintiles, to the lowest rate of 188 in the most advantaged areas. This suggests that people living in more disadvantaged areas, who are more likely to be on lower incomes, are receiving the most benefits from lighting replacements.

Shower rose

The second most common upgrade was replacement of low-efficiency shower roses with more efficient units. A total of 71,987 upgrades were undertaken, creating 135,188 VEECs. The distribution of these upgrades between areas by IRSAD quintile is presented in Figure 4.2.

Figure 4.2 VEECs per 100 dwellings by IRSAD quintile: shower roses

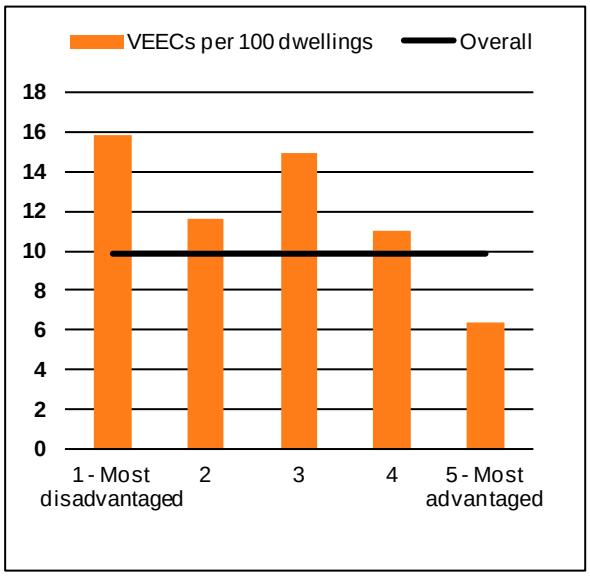


Figure 4.2 indicates a similar trend to that for lighting, with the highest rate of VEEC creation in the most disadvantaged areas (15.86 per 100 dwellings) and the lowest rate in the least disadvantaged areas (6.4). However, for shower rose upgrades, there is a dip for quintile 2.

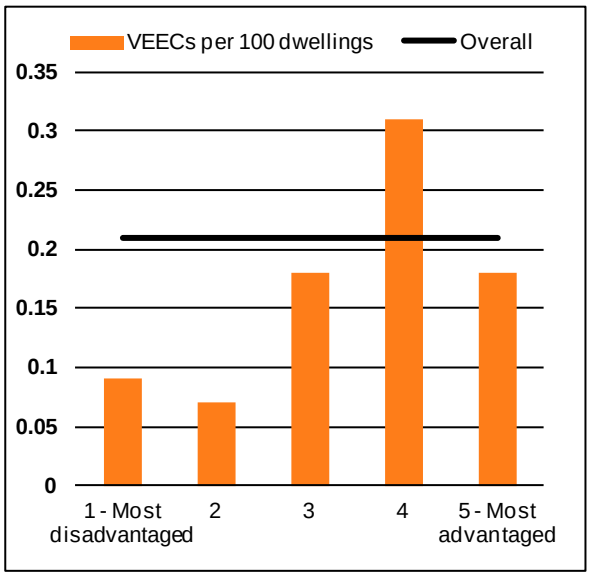
High-cost, high-impact activities

This section presents results of analysis of activities that have the highest energy-saving impact (as represented by VEEC creation).

Space heating

To understand the distribution of VEECs related to space heating, analysis was undertaken of VEEC creation through installation of, or replacement of electric systems with, high-efficiency ducted gas and flued gas space heating systems. The results are presented in Figure 4.3.

Figure 4.3 VEECs per 100 dwellings by IRSAD quintile: all space heating upgrades



Households in postcode areas in IRSAD quintile 4 received the highest rate of VEECs (0.31 per 100 households), more than three times the rates for quintile 2 (0.07) and quintile 1 (0.09).

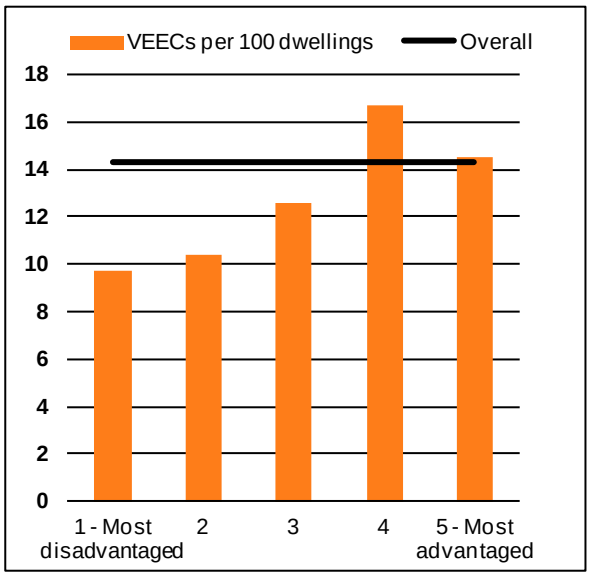
With respect to both gas replacement of electric heating and all heating efficiency upgrades homes in advantaged areas have benefited from VESI much more than those in disadvantaged areas.

Water heating

Seven types of water heating upgrade are recognised in the VESI (see Table 4.2 above), including upgrades from electric systems to gas and solar. Mean VEECs for water heating upgrades range from 7 for solar pre-heat systems, to 57.79 for gas-boosted solar. The latter is the second-highest rate of VEECs per activity after replacement of electric space heating with a gas system.

All hot water upgrades were aggregated and analysed. The results are presented in Figure 4.4.

Figure 4.4 VEECs per 100 dwellings by IRSAD quintile: all hot water upgrades

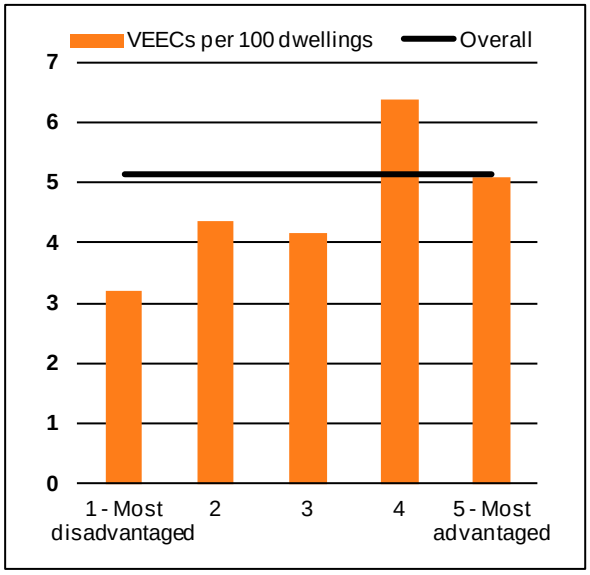


As Figure 4.4 shows, the greatest benefit from VEEC creation for hot water upgrades flowed to households in advantaged areas. The rate of VEEC creation from hot water upgrades is above the

mean (14.33 per 100 households) in IRSAD quintile 4 (16.68) and quintile 5 (14.49) and below the mean in quintiles 3, 2 and 1 (12.59, 10.36 and 9.75 respectively).

The creation of VEECs from replacing electric hot water services with gas-boosted solar systems was also analysed separately, because this activity represents a high number of VEECs per installation. Figure 4.5 presents the rate of VEEC creation for decommissioning electric and installing gas/LPG-boosted solar in households in each IRSAD quintile.

Figure 4.5 VEECs per 100 dwellings by IRSAD quintile: gas-boosted solar hot water

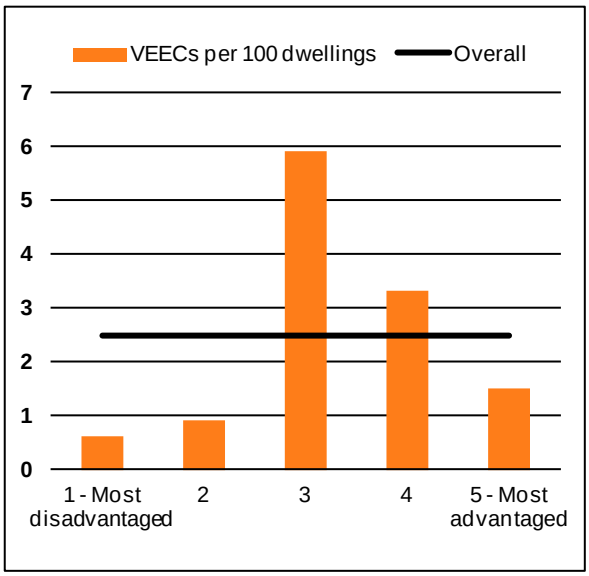


The highest rate of VEECs (6.38) was created in households in quintile 4, the second most advantaged postcode areas. The most disadvantaged areas (quintile 1) received only 3.21 VEECs per 100 dwellings, half the rate of quintile 4 and considerably below their fair share of VEECs from this activity (mean = 5.15).

Ceiling insulation

There are 688 VEET activity records for ceiling insulation installations in metropolitan Melbourne, with a combined value of 34,291 VEECs. Figure 4.6 shows the rate of VEEC creation from ceiling insulation installations in each IRSAD quintile.

Figure 4.6 Rate of VEECs created per 100 dwellings by IRSAD quintile: ceiling insulation



The rate of VEEC creation from insulation is substantially higher (5.93 per 100 dwellings) in the postcode areas in IRSAD quintile 3, ranked as 'average' in relation to advantage and disadvantage. The rate is lowest for quintiles 1 (0.63) and 2 (0.89), the more disadvantaged areas.

Postcodes where most VEECs were created

The twenty postcodes with the highest rate of VEEC creation were also identified for the three main areas of VEET activity—light globes, showerheads and hot water upgrades. The results are shown in the Appendix.

5 Discussion

A clear pattern emerged in the installation of energy efficiency upgrades in homes in metropolitan Melbourne through the Victorian Energy Saver Incentive scheme. Key results are discussed below.

Equity and overall benefits

Overall, more VEECs have been created in areas that are disadvantaged compared to those areas that are relatively advantaged. This has mostly been through the low-impact activities of light globe and shower rose upgrades. From a social equity perspective, this appears to be a positive outcome of the scheme.

While this analysis did not directly investigate *why* relatively more of these activities occurred in disadvantaged areas, it is worth considering factors that may have contributed to this outcome. It is not surprising that the free provision of light globes and showerheads is likely to have increased the overall take-up of these measures. It is less clear, however, why these measures have been taken up significantly more by households in disadvantaged areas.

Low-income households may have had a lower initial incidence of energy-efficient light globes and showerheads. This is supported by the limited evidence that does exist, such as the Roy Morgan Research (2008) which suggests concession–card carrying households have slightly lower incidence of showerheads and of compact fluorescent globes in bedrooms. The lower initial incidence of these measures in low-income households may reflect cost barriers, discounting of the future savings from energy efficiency, and information barriers. By calling households directly, providing information on the benefits of the measures and providing the measures free of charge energy, retailers may have effectively overcome the main barriers to energy efficiency in low-income households. However, the level of difference identified in the Roy Morgan research between concession–card holding and other households does not appear to be sufficient to fully explain the significantly higher take-up rates in more disadvantaged areas under the VESI scheme.

The marketing approaches employed by the energy service companies to recruit households to the scheme, such as providers going door-to-door replacing light-bulbs and providing shower-heads at no cost to the householder, may also be more successful in disadvantaged areas. Some companies may have also targeted these areas. The greater amount of time people in low-income households spend at home is likely to have contributed to the success of these strategies and the higher take-up rates by these households. If a householder is at home more often, the energy service company is more likely to reach them through ‘cold calling’ and be able to arrange a time to visit the home to install the devices (as is required by the program guidelines).

A more problematic aspect of the marketing approach is the possibility that some low-income households, particularly those unfamiliar with their consumer rights (for example newly arrived or non–English speaking residents), may have felt obliged to participate in the program. Anecdotal reports from other energy programs indicate that some households feel obliged to accept offers where these are portrayed as a government service. Such issues are worthy of further consideration in relation to the VESI scheme.

Finally, the VESI scheme may have been successful in addressing a nascent demand for energy efficiency measures. Householders in disadvantaged areas may have been open to energy efficiency measures, but restricted by cost, information and trust barriers.

A word of caution on the success of these high-prevalence activities is warranted. A close analysis suggests this result may actually *reduce* the opportunities for more substantial retrofitting activities within the same homes. The process is sometimes referred to as 'cream skimming'; when the more cost-effective energy efficiency measures are implemented and other, less cost-effective opportunities are left behind (ICLEI 2008). Under the current VESI business models, the remaining energy efficiency opportunities may never be cost-effective. However, if they were offered as a whole package, with the more cost-effective opportunities subsidising the others, the household is like to receive a better overall result. Two items for which this might apply are weather-sealing of gaps and cracks, and energy-saving advice. Such measures are likely to be more cost-effective when coupled with the delivery of low-cost measures such as light globes and showerheads. However, the current structure of the VESI, combined with the business models employed by service providers, favours approaches which focus on single or double-item visits.

An incentive built into the VESI scheme to provide an additional benefit for whole-of-house or multiple retrofit measures in one arrangement is likely to lead to better outcomes for individual households and may result in more cost-effective outcomes for the entire scheme.

Equity and high-impact benefits

Households in postcode areas in the middle and more advantaged areas of metropolitan Melbourne have received more VEECs for high-impact activities such as hot water and heating upgrades. These measures are likely to include a householder co-contribution and the items generate significantly higher savings per household than the low-cost measures like replacing showerheads and light globes. In most cases such measures also receive significantly higher subsidies per item.

This finding is problematic on equity grounds for two reasons. First, people in more disadvantaged areas are not getting their equal share of the high-impact energy efficiency upgrades occurring through the VESI. Many of the measures where a substantial up-front contribution from the householder is required also generate a relatively high number of VEECs. Households on low incomes may effectively be restricted from accessing those measures which generate a large number of VEECs. Second, people in the more disadvantaged areas are more likely to have a low income and therefore to be spending a higher proportion of their income on energy than those with higher incomes (ABS 2004). They would therefore benefit more from efficiency upgrades that effect a decrease in their energy costs.

The top twenty postcodes for hot water upgrades (see the Appendix) include a number of locations with limited or no access to reticulated natural gas. While most of greater Melbourne has reticulated gas, some suburbs, and some individual streets within suburbs do not. The lack of gas in these areas may contribute to the take-up of hot water installations. Within the VEET scheme and in others such as the rebate scheme run by Sustainability Victoria larger incentives are offered for households in non-gas areas to switch to solar hot water. Further analysis of the correlation between the available rebates and the location of hot water installations would be useful.

Two other factors may contribute to the uneven distribution of high-return energy efficiency measures:

- lack of up-front capital or suitable financing
- greater discounting of the benefits of energy efficiency.

Up-front capital costs have been identified as a barrier to households implementing energy efficiency measures in their homes. Many low-income households simply do not have the up-front cash to invest in new household appliances, even if they understand that these are more efficient and will lead to savings in the long term. In addition there is evidence that some low-income households place more value on a dollar in hand today than the projected future savings from increased energy efficiency. Hausman (1979), for example, identified that low-income households discount the future benefits of savings from purchasing energy-efficient appliances more than wealthier households do. As a result those measures under VESI for which households have to pay a large up-front cost are less likely to be taken up by households on a low income, even if they may lead to reasonable savings over time.

This barrier will become more of an issue as the VESI continues. The lower cost measures, which require little or no co-contribution, will be exhausted and the level of co-contribution required for other measures will be higher. This is likely to make it more difficult for low-income households, with less ready cash or access to credit, to participate in the scheme.

A specific sub-obligation for retailers to ensure energy savings in low-income households will provide a real impetus for the retailers to develop more innovative and cost-effective approaches to ensure such households are able to access the measures that require a larger co-contribution.

Equity and access to insulation

Insulation represents less than 1 per cent of all VEECs created. The low number, which is contrary to initial expectations, reflects actions taken by the Minister for Energy and Resources following the introduction of the Commonwealth Government's Home Insulation Program. To avoid duplicating the incentive for installing insulation, the emissions reduction value for insulation under the VESI was reduced to zero, effectively removing it from the scheme (DPI 2011a).

The distribution of insulation VEECs was markedly different from other categories, with a significant peak in the middle quintile 3and much lower rates in the more disadvantaged first and second quintiles.

It is difficult to explain this pattern, but it may relate to the expense of insulation, or to the higher proportion of people on lower incomes who live in rental properties, where a split-incentive may deter landlords from installing insulation. It is disappointing that households in the most disadvantaged areas have missed out, as they are most likely to benefit from the cost saving and thermal comfort benefits of insulation but less likely than others to be able to afford the costs of installing insulation themselves.

Recommendations

The analysis leads us to the following recommendations which should be implemented to improve the overall effectiveness of the scheme and increase the uptake of higher cost measures in low-income households.

To address the up-front capital barrier to higher cost energy efficiency measures such as upgrading to a more efficient hot water service, the Victorian Government should:

1. Introduce additional financial incentives for low-income households to access higher value measures. This could be achieved by expanding Sustainability Victoria's rebates targeted at measures which present a substantial capital barrier, such as hot water and heating.

2. Investigate the viability of on-bill financing and low-interest loans as potentially affordable credit mechanisms to assist low-income households to access higher cost energy efficiency upgrades.

To foster equitable outcomes for the VESI scheme across different socioeconomic groups, the Victorian Government should:

3. Conduct and publish annual surveys of the distribution of VESI residential energy efficiency measures in relation to socioeconomic disadvantage. The analysis should include the distribution of specific measures (such as hot water services).

4. Develop data collection and release processes that improve opportunities to assess program impacts.

5. Investigate the effectiveness of specific targets for disadvantaged households participating in the scheme, along the lines of the priority group and fuel poverty target in the United Kingdom's Carbon Emission Reduction Target Scheme.

To maximise the overall effectiveness of the scheme, and the benefits for individual households, the Victorian Government should:

6. Introduce an additional financial incentive for providers who deliver multiple retrofit measures in one house.

In addition, the Victorian Government should:

7. Develop programs to involve landlords in the scheme. These might include information for landlords and programs to assist tenants gaining consent from landlords

8. Promote greater links between the VESI scheme and other residential energy efficiency programs.

The results of this study also have implications for the proposed National Energy Savings Initiative (DCCEE & DRET 2011). The Australian Government should incorporate these recommended improvements in their design for a national scheme.

6 Conclusion

This report presents evidence identifying the distribution of the benefits flowing from the VESI. This evidence reveals inconsistent results on equity grounds. Using VEET scheme data, matched to the IRSAD, we have demonstrated overall VEEC creation has benefited householders in areas of greater disadvantage. Using Culyer's (2001) definition of equity as 'distribution that is to the advantage of the least advantaged' (p. 275), the VESI overall has been successful on equity grounds. However, Braveman's (2003) definition of equity as the 'absence of disparities' has not been achieved, as the highest-impact efficiency activities flowing from the scheme have gone more to households that are more advantaged.

Households on lower incomes spend a higher proportion of disposable income on energy than do those on higher incomes. If the benefits of VESI that are most likely to have the largest impacts on household energy costs flow to more advantaged households, this compounds pre-existing inequities. Furthermore, light globe replacements, which account for the majority of VEECs created in more disadvantaged areas, are nearing saturation levels (DEWHA 2008). Therefore, the equity gap identified in this paper is likely to widen if steps are not taken to address it.

7 Appendix: Top 20 postcodes for VEECs from selected activities

Table 7.1 Lighting— Top 20 postcodes for VEEC creation per 100 dwellings

Postcode	IRSAD quintile	VEECs per 100 dwellings	Suburbs
3027	#N/A	1849	Laverton RAAF, Williams RAAF, Williams Landing
3428	4	635	Bulla
3802	4	619	Endeavour Hills
3059	5	588	Greenvale
3975	4	542	Lynbrook, Lyndhurst
3803	3	512	Hallam
3064	3	506	Craigieburn, Donnybrook, Kalkallo, Mickleham, Roxburgh Park
3075	1	499	Lalor, Lalor Plaza
3061	1	492	Campbellfield
3038	4	489	Keilor Downs, Keilor Lodge, Taylors Lakes, Watergardens
3022	1	481	Ardeer, Deer Park East
3074	1	477	Thomastown
3034	4	470	Avondale Heights
3076	3	467	Epping, Epping dc
3976	2	457	Hampton Park
3048	1	450	Coolaroo, Meadow Heights
3021	1	445	Albanvale, Kealba, Kings Park, St Albans
3082	4	439	Mill Park
3060	1	438	Fawkner, Fawkner East, Fawkner North
3804	5	438	Narre Warren East, Narre Warren North

Note: results for VEET activities 16 and 21a combined

Table 7.2 Showerheads — Top 20 postcodes for VEEC creation per 100 dwellings

Postcode	IRSAD quintile	VEECs per 100 dwellings	Suburbs
3027	#N/A	242	Laverton RAAF, Williams RAAF, Williams Landing
3048	1	52	Coolaroo, Meadow Heights
3022	1	51	Ardeer, Deer Park East
3064	3	35	Craigieburn, Donnybrook, Kalkallo, Mickleham, Roxburgh Park
3061	1	30	Campbellfield
3428	4	26	Bulla
3052	5	23	Melbourne University, Parkville
3076	3	23	Epping
3975	4	22	Lynbrook, Lyndhurst
3047	1	22	Broadmeadows, Dallas, Jacana
3024	3	21	Mambourin, Mount Cottrell, Wyndham Vale
3029	4	21	Hoppers Crossing, Tarneit, Truganina
3976	2	19	Hampton Park
3337	3	19	Kurunjang, Melton, Melton West, Toolern Vale
3049	3	19	Attwood, Westmeadows
3030	4	19	Cocoroc , Derrimut, Point Cook, Quandong, Werribee, Werribee South
3803	3	19	Hallam
3082	4	18	Mill Park
3168	4	18	Clayton, Notting Hill
3023	3	18	Burnside, Burnside Heights, Cairnlea, Caroline Springs, Deer Park, Deer Park North, Ravenhall

Table 7.3 Hot water upgrades— Top 20 postcodes for VEEC creation per 100 dwellings

Postcode	IRSAD quintile	VEECs per 100 dwellings	Suburbs
3097	5	275	Bend of Islands, Kangaroo Ground, Watsons Creek
3099	5	187	Arthurs Creek, Cottles Bridge, Hurstbridge, Nutfield, Strathewen
3091	5	145	Yarrambat
3428	4	132	Bulla
3916	5	123	Merricks, Point Leo, Shoreham
3782	4	120	Avonsleigh, Clematis, Emerald, Macclesfield
3090	5	102	Plenty
3791	5	101	Kallista
3139	4	95	Beenak, Don Valley, Hoddles Creek, Launching Place, Seville, Seville East, Seville East, Wandin East, Wandin North, Woori Yallock, Yellingbo
3783	4	93	Gembrook
3918	4	77	Bittern
3808	5	75	Beaconsfield Upper, Dewhurst
3159	5	67	Menzies Creek, Selby
3096	5	59	Wattle Glen
3113	5	52	North Warrandyte, Warrandyte
3158	4	51	Upwey
3781	3	51	Cockatoo, Mount Burnett, Nangana
3335	1	48	Plumpton, Rockbank
3160	5	48	Belgrave, Belgrave Heights, Belgrave South, Tecoma
3919	2	48	Crib Point

Note: results for all hot water upgrades combined

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