Brotherhood
of St Laurence
Working for an Australia free of poverty

Enabling low-income households in the private rental market to respond to climate change

Recommendations and report
from the roundtable
convened December 2007
by the Brotherhood of St Laurence

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The graph on page 22 is from the report *Strategic study of household energy and greenhouse issues*, prepared by Sustainable Solutions Pty Ltd for Environment Australia, and published by Australian Greenhouse Office 1998. It is copyright Commonwealth of Australia, reproduced by permission.

Finally, we would like to thank Deborah Patterson for her editing expertise.

Abbreviations

AGO	Australian Greenhouse Office
CFL	compact fluorescent lamp
ETS	emissions trading scheme
HAF	Housing Affordability Fund
NRAS	National Rental Affordability Scheme

Summary of recommendations

The Brotherhood of St Laurence roundtable, *Low-income households in the private rental market*, brought together key actors from state and local government, the housing and welfare sectors, banking and developers. The event grew from a concern about the likely impacts of climate change and climate change mitigation measures on low-income households. Participants addressed the specific barriers faced by low-income private renters to increasing their energy efficiency and reducing the impacts of climate change.

The recommendations below were agreed at the end of the roundtable held in Melbourne on 18 December 2007. A full list of participants appears in the Appendices.

Position statements

1. Governments and business need to recognise that both climate change and action to mitigate climate change will disproportionately disadvantage low-income households in the private rental market.

2. Governments need to undertake urgent action to help low-income households in the private rental market reduce their energy use.

3. This action needs to be substantially undertaken *before* a National Emissions Trading Scheme (ETS) is implemented in 2010.

4. In designing the Emissions Trading Scheme and complementary measures, the interests of low-income households in the private rental market need to be specifically considered and addressed.

5. Permits under the Emissions Trading Scheme should be auctioned and a substantial share of revenue from the auction should be made available to assist low-income private renters to reduce their energy use. This is preferred over price subsidies or financial compensation for low income earners, since compensation tends to be eroded over time. Assistance with energy efficiency provides sustainable long-term benefits for both the tenants and the environment. However this assistance must be widespread, not tokenistic, to be effective.

Measures which will particularly assist low-income renters

6. Key opportunities for lowering energy use in private rental housing that should be supported and encouraged are:
   - household energy audits
   - low-energy hot water
   - low-energy heating and cooling solutions including insulation
   - low-energy fridges and appliances
   - compact fluorescent lamp (CFL) retrofits.

7. The definition of ‘affordable housing’ in national affordable housing goals needs to include broader costs related to housing and in particular associated energy and transport costs.

8. The National Rental Affordability Scheme (NRAS) and the Housing Affordability Fund (HAF) provide opportunities for federal, state and local governments to improve the energy and environmental performance of new housing. Improved energy and environmental performance will provide long-term benefit for tenants, and raise standards for the market. High standards should be made a condition of funding under these programs.

9. Additional funding for energy efficiency initiatives under NRAS and HAF should come from outside the housing budget. Possible sources include emissions trading scheme auction revenue and state and federal environment budgets.

10. A flexible suite of programs is needed to support low-income renters to be more energy-efficient. Current programs need to be substantially expanded. Appropriate actions include:
    - improved mandatory housing standards
    - large-scale energy auditing and rebate programs
    - federal and state tax incentives to encourage landlords to invest in energy efficiency
    - council incentives for improved energy and environmental performance by developers (such as fast-track processing or advice)
    - improved information about the energy efficiency of rented properties (potentially mandatory before the lease is signed).

11. Potential major players in the private rental sector need to be engaged in discussions and measures to assist low-income private renters. These include large investors, superannuation funds, industry associations (including real estate industry peak bodies and professional associations), bodies corporate, financiers and developers. Government funding programs affecting these groups could have conditions attached that require improved energy efficiency and/or support for low-income renters.

12. There are opportunities for joint ventures involving electricity retailers and financiers (banks) to provide funding and support for improved energy efficiency in private rental accommodation. This could reduce up-front costs to tenants for energy-efficient appliances (e.g. fridges) or heating and cooling solutions (e.g. insulation) by having tenants pay off the cost in instalments with savings made from reduced future energy bills. Governments should play a facilitating role and banks and financiers should be urged to develop a range of such joint ventures.

13. Energy tariff structures need to take account of low-income renters, for example by removing perverse incentives like high fixed charges in electricity bills that discourage energy efficiency.

14. 'Hardship' obligations, which require retailers to provide support for people facing difficulties paying energy bills, should be placed on retailers in the National Energy Framework, along the lines existing in Victoria.

Measures to assist all renters, including low-income renters

15. Regulations and by-laws that discourage energy efficiency should be reviewed and where appropriate abolished. For example, body corporate (or strata scheme) rules prohibiting the hanging of washing on lines or balconies should be removed.

16. Clear information should be provided to landlords, tenants and others like bodies corporate on the opportunities for improved energy efficiency in private rental properties.

17. Urban planners need to take greater account of climate change and warming factors, since they play a critical role in determining how low-income households are affected. Key issues include the design of new houses and suburbs, urban sprawl and access to public transport. Poor public design can exacerbate the impact of climate change. Black roads, dark roofing and lack of trees increase urban temperatures by up to 1.5 degrees.

Introduction

The International Panel on Climate Change's fourth assessment report (IPCC date) highlighted the need to make timely and deep cuts to human-induced greenhouse gas emissions. Significant attention is being paid to how Australia and other countries can reduce our emissions and adapt to a changing climate environment. The Garnaut Climate Change Review and the subsequent introduction of an Australian emissions trading scheme will focus further attention on the economic and social impacts of greenhouse gas mitigation.

As Australia grapples with the challenges of climate change, it is essential that the interests of low-income households are not left out of the debate. These households are more vulnerable to climate change impacts, and less able to adapt to the changing climate and the impacts of climate change mitigation, such as energy price rises.

This report proposes actions to reduce the impact of climate change mitigation measures such as an emissions trading scheme on low-income households in the private rental market.

Climate change and low-income households

All Australians, and low-income households in particular, face significant and increasing threats from climate change. The country's geographic diversity means that the impacts and risks will vary across Australia; however the Australian Greenhouse Office outlined the main impacts of climate change with implications for Australian buildings. They include:

- increased energy consumption due to higher temperatures
- health effects of over-heating
- increased risk of damage from more intense tropical cyclones, storms and stronger winds; from increased cracking of drier soils; and from increased ground movement affecting foundations and pipe work
- increased damage from flooding
- increased bushfire risk (AGO 2007, p.3).

In the short to medium term, one of the most significant impacts on low-income households will result from the introduction of a full carbon pricing regime such as an emissions trading scheme (ETS). Research conducted by the National Institute for Economic and Industry Research (NIEIR 2007) for the Brotherhood of St Laurence looked at both the direct costs of carbon pricing on energy prices and also the embedded costs of all household goods and services. The research showed that if there were no compensating factors, pricing carbon at $25 per tonne would add 2.3 per cent to the annual cost of living for poor Australian households (see Box 1). Pricing carbon at $50 per tonne would add 4.6 per cent to those same Australian budgets.

Significantly, there will be other increased costs that are not included in this modelling. For example, the predicted increased frequency and intensity of drought and other extreme weather events are likely to lead to increased costs for agricultural products and consequently increased food prices.

The potential impact of an emissions trading scheme on low-income households means that policy makers must proceed carefully in introducing the new scheme and take action to minimise this impact. We must however take action. Without appropriate action, low-income households will bear the brunt of the consequences of climate change.

Box 1: Impact of carbon prices on different Australian household types

The table below summarises the results of economic modelling of the impact on households of carbon pricing, research conducted by the National Institute for Economic and Industry Research for the Brotherhood of St Laurence.

Household type	**Utility-adjusted carbon costs additional annual expenditure (2006 dollars)**		**Utility-adjusted carbon costs as % of annual expenditure**	
Carbon price per tonne	**$25**	**$50**	**$25**	**$50**
Poor family households	557.70	1115.40	2.3	4.6
Working age social security dependent family type one	571.70	1143.30	2.2	4.3
Age pension households	303.00	606.00	0.8	1.6
Low skilled households	366.80	733.60	1.0	1.9
High-income tertiary-educated households	368.70	737.40	0.4	0.7
Average	*351.10*	*702.30*	*0.7*	*1.4*

The analysis used two possible carbon prices, \$25/t CO_2-e and \$50/t CO_2-e. The results have been adjusted using a utility approach, which weights the results according to the relative prosperity of those bearing the costs or receiving the benefits; an additional cost of, say, \$600 per year, is more affordable for a high-income household than it is for a low-income household.

The results show that the impact of a carbon price of \$25/t CO_2-e on 'poor households' would be about \$560 per year in additional household expenditure, or an additional 2.3% of annual household expenditure (see table). If the carbon price doubled to \$50/t, the additional expenditure would also double to almost \$1120 per year, representing an additional 4.6% of annual household expenditure. These figures compare with 0.4% and 0.7% respectively for 'high-income tertiary educated households', even though low income households use less energy.

Sources: Sherrard & Tate (forthcoming); NIEIR 2007

Vulnerability to climate change

The impact of climate change on a household, or segment of society, depends both on the particular physical or economic changes and on the household's vulnerability. A household's vulnerability is in turn affected by their capacity to adapt to the risks posed by climate change and climate change mitigation. This capacity is affected by factors including income sources, age, health, tenure security, education, dependants, social networks, information, and access to services/resources (Gurran 2007, p.4).

Low-income households are particularly vulnerable to climate change because of their limited financial resources.

In much of Australia, low-income private tenants already face rising rents and unprecedented housing affordability stress. These households are also over-represented among those who are unable to pay their utility bills (CfM 2004). Price increases resulting from an emissions trading system, and others associated with climatic changes, will be a further burden on already stressed renters.

Low-income households also often live in low-quality or substandard housing, which increases their exposure to the impacts of climate change. Their houses often have limited or no insulation and have outdated heating and cooling facilities. Such features reduce liveability, increase the cost of heating in summer and cooling in winter, and add to health risks in extreme summer or winter conditions. Many

low-income households also have limited or no insurance, so they risk serious losses from the predicted increase in extreme weather events.

Barriers to energy efficient measures

As a group, low-income renters face specific barriers in responding to climate change. The classic problem is split incentives between the landlord and the tenant. Landlords have limited incentive to institute energy efficiency measures because they will gain no financial benefit from reduced energy bills. While renters will receive the benefit, they are unlikely to be able or willing to pay the considerable up-front cost, particularly when they have limited security of tenure.

Low-income renters often face a further difficulty. Their housing is generally at the residual end of the rental market. Energy efficiency in these dwellings is often poor but landlords are often reticent to spend money on improvements. Where improvements are made they often lead to increased rent which places further stress on low-income tenants.

Like others, low-income households face a knowledge barrier and associated costs in time and energy trying to work out the most energy-efficient and cost-effective purchases.

Roundtable on low-income households in the private rental market

In December 2007, the Brotherhood of St Laurence, with partners including the Committee for Melbourne and former Victorian Deputy Premier , the Hon. John Thwaites, convened a roundtable with the specific aim to address the issues that climate change presents to low-income households in the private rental market. The invited guests came from industry, government, academia and non-government organisations.

The roundtable focused on measures to improve household energy efficiency, and considered related issues including energy pricing. The recommendations agreed by the roundtable are outlined in this report. The following themes emerged in the discussions.

Timely action: Action to improve the energy efficiency of low-income renters needs to occur *before* the introduction of a full carbon pricing regime. Early action will reduce the shock of price rises and reduce the need for more drastic action later.

Household, environmental and human capital benefits: There are multiple gains to be made from addressing energy efficiency in low-income private rental households. The obvious benefits include reducing energy consumption and greenhouse emissions. This will in turn reduce the financial pressures on low-income households. There are also real opportunities to combine a human capital agenda around employment and training with the new job opportunities related to environmental improvements in new and existing houses.

Partnerships and flexible institutional approaches: Successfully addressing the barriers faced by low-income households in the private rental market will require new partnerships and flexible institutional arrangements. One significant partnership identified in the recommendations would involve energy retailers, government, community service organisations and the financial sector in developing schemes that enable low-income households to access finance for energy efficiency improvements.

This report outlines a series of measures that will reduce the barriers for low-income households to access more energy-efficient homes. The recommendations are grouped in the following areas:

- general recommendations
- the emissions trading scheme
- household energy efficiency measures
- measures related to new housing for low-income private renters

- measures related to existing houses
- body corporate regulations
- energy tariffs and hardship policies
- joint ventures
- urban planning and design.

Discussion and recommendations

Addressing disproportionate impact of climate change on low-income private renters

Recommendation 1: Governments and business need to recognise that both climate change and action to mitigate climate change will disproportionately disadvantage low-income households in the private rental market.

The disproportionate impact of climate change on low-income households is outlined in the introduction.

The roundtable recognised that many in government, including Minister Penny Wong and Minister Peter Garrett, have publicly recognised the disproportionate impact of an ETS on low-income households. Similarly, Professor Ross Garnaut has highlighted the impact of an ETS on low-income households and the need for measures to mitigate this impact.

Recommendation 2: Governments need to undertake urgent action to help low-income households in the private rental market reduce their energy use.

Recommendation 3: This action needs to be substantially undertaken *before* a National Emissions Trading Scheme (ETS) is implemented in 2010.

Measures to reduce energy usage in low-income households provide a win-win situation by reducing their exposure to the impacts of carbon price increases and reducing their greenhouse gas emissions.

To ensure low-income private renters are not unduly affected by an (ETS), policies and programs need to be developed now, well before the implementation of the ETS.

Government policies and programs

A number of existing government policies and programs already address household energy efficiency. These include:

- rebates for hot water services and ceiling insulation
- market-based incentives such as the NSWGGAS scheme and the forthcoming Victorian Energy Efficiency Target scheme (VEET)
- energy concessions and hardship schemes
- home audit and retrofit schemes funded by government or through hardship schemes offered by energy retailers
- off main power grid programs such as the Australian Government's Renewable Remote Power Generation Program (RRPGP).

Many of these programs are referred to in the recommendations below.

Given that the ETS will affect all Australian households, it is essential that these programs are extended to all areas and a greater proportion of the population.

Many of the current programs cover only a fraction of their target population. The Energy and Water Taskforce in Victoria, for example, is a good program; however it only covers a small percentage of the low-income households which could be eligible for household retrofits. The impact of national carbon pricing will make it essential to cover as many low-income households as possible.

Specific attention should be paid to whether the programs provide sufficient incentives to enable low-income private renters to benefit. In particular, rebates and loan schemes are more likely to be taken up by wealthy households than by low-income households. In developing new schemes, or expanding existing schemes, other points which should be considered include:

- Greater attention needs to be paid to ensuring the most cost-effective measures are employed in each scheme, and to understanding how low-income households use energy.
- New programs should cover a comprehensive range of energy efficiency needs.

Emissions trading scheme

Recommendation 4: In designing the Emissions Trading Scheme and complementary measures, the interests of low-income households in the private rental market need to be specifically considered and addressed.

Since low-income households in the private rental market also face significant barriers to adapting to a new trading scheme, the ETS should be designed with explicit reference to the interests of low-income households and private tenants in particular. The design of the national ETS will be the subject of a separate Brotherhood roundtable.

Recommendation 5: Permits under the Emissions Trading Scheme should be auctioned and a substantial share of revenue from the auction should be made available to assist low-income private renters to reduce their energy use. This is preferred over price subsidies or financial compensation for low income earners, since compensation tends to be eroded over time. Assistance with energy efficiency provides sustainable long-term benefits for both the tenants and the environment. However this assistance must be widespread, not tokenistic, to be effective.

Method of permit allocation

The method of allocation of permits will be of central importance in a national emissions trading scheme.

Auctioning of permits will provide a significant revenue stream which can be used to mitigate the impacts of an emissions trading scheme on low-income households, for example through financing household energy efficiency and other compensatory measures.

On the other hand, permits issued free would be likely to lead to windfall profits, as occurred with the European Union Emissions Trading Scheme (EUETS). In Europe, free allocation did not benefit consumers, since power generators still passed on the value of the permits to residential and industrial consumers through increased prices.

Further, free permits will not lead to a lower price for carbon. The price for carbon will depend on its scarcity (the cap) and the marginal cost of abatement (the amount it will cost a firm to reduce emissions by one additional unit).

There are a number of microeconomic arguments against the free allocation of permits and in favour of auctioning. Evans and Peck (2007) outline the positive effect of auctions on efficiency. They argue an auction:

- creates information about the cheapest marginal abatement mechanisms
- awards permits in line with individual incentives
- will bring emissions management and opportunities for abatement to the attention of top managers and
- is suited to generating early and transparent price signals and is likely to help companies in their investment decisions regarding abatement measures.

In addition Evans and Peck point out that:

- Past experience (for example in Europe) suggests that auctioning will decrease transaction costs of negotiating free allocation—including all lobby costs of industry—compared to a simple free allocation.
- Free allocation to incumbents will make it more likely that new entrants will be allocated free permits. Free allocation to new entrants and closure rules may distort the system.

Any minor exceptions allowing free allocation should include an explicit end point or sunset clause.

Distribution of revenue raised

There will be a number of competing claims for compensation from the pool of revenue raised through an ETS. Sufficient funds from the revenue should be allocated to measures which will ensure low-income households are not made worse off by the scheme. The amount of support should be based on estimates of the cost impact on low-income households and of the amount required to offset these impacts.

One important step will be developing programs which facilitate energy efficiency in low-income households. Specific measures will need to be adapted for low-income private renters. These measures will reduce households' exposure to higher energy prices by reducing their consumption without affecting their access to energy.

Household energy efficiency improvements

Recommendation 6: Key opportunities for lowering energy use in private rental housing that should be supported and encouraged are:

- **household energy audits**
- **low-energy hot water**
- **low-energy heating and cooling solutions including insulation**
- **low-energy fridges and appliances**
- **compact fluorescent lamp (CFL) retrofits.**

Numerous studies have identified the cost effectiveness of residential energy efficiency savings. They include a series of studies undertaken for the National Energy Efficiency Framework (see, for example, SEAV 2003, SEAV 2004, Wilkenfeld 2004).

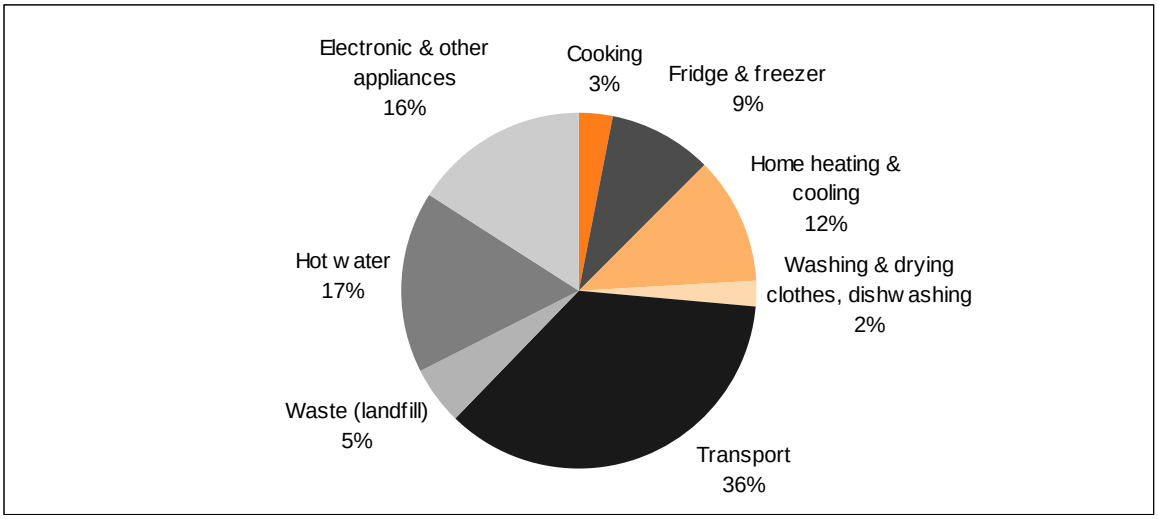
Energy efficiency measures can be undertaken in both new and existing households and many are relevant to all income groups. However, low-income private renters will require additional support to implement them.

The average emission profile for the average Australian household is shown in Figure 1. The emission figures provide a useful guide to the likely exposure of households to increased costs related to direct household energy usage and indicate priority areas for reductions.

Average household emission data do not, however, reflect many significant factors including income and location which are directly related to transport expenses. For example, a two-car household in the outer suburbs of a capital city with limited access to public transport may have a much higher transport emissions profile than a single-car household in the inner city.

Significantly, low-income households spend a much larger share of their average weekly income on utilities (electricity, gas and water) than do high-income households (NIEIR 2007). NIEIR's research shows that a poor family household (see Appendix 2 for definitions of household types) spends 6.8 per cent of their average weekly expenditure (excluding rent) on utilities, whereas a high-income tertiary-educated household spends only about 3 per cent of their weekly expenditure (excluding rent) on utilities, although the total expenditure is higher in the higher income household (NIEIR 2007, p.11). Therefore, low-income households will be disproportionately affected by price rises.

Figure 1 : Emission profile for an Australian household



Source: Department of Sustainability and Environment (2007)

Energy audits

Professional energy audits provide a means to assess the most cost-effective measures in a given household. They also enable direct contact with the household and the delivery of information. For the householder a trusted energy auditor will reduce the time and energy required to decide which measures are necessary.

Extensive international experience has shown the benefits of energy audits combined with household retrofit programs in low-income households. Examples include Warm Front in England, and the Weatherization program in the United States. Similar programs such as the Victorian Energy and Water Taskforce have operated on a smaller scale in Australia.

Low-energy hot water

Hot water is a major area of household energy usage. Significant energy savings can be made by reducing hot water consumption (Wilkenfeld 2004).

Measures to reduce consumption include switching to efficient showerheads and washing machines, reducing leaks, and changes in behaviour. Many water companies provide incentives to switch to water-saving showerheads. In most instances, however, tenants require the permission of landlords to switch the showerhead.

Switching to more efficient hot water heating will also result in large savings. Savings can be made by:

- reducing heat losses from pipes
- insulating existing water heaters
- at the time of replacements switching to the most efficient water heaters, including substituting for a better insulated unit
- replacing electric water heaters with solar or gas heaters (in small households, instantaneous gas hot water systems should be considered).

A number of studies have investigated the likely rate of return and years for payback of various hot water systems (see, for example, Wilkenfeld 2004).

Insulation and sealing

Insulation and weather sealing are important measures to increase household thermal efficiency and reduce heating and cooling costs. The potential energy savings from insulation and sealing are extremely high and suggest the need to consider extending insulation rebate programs.

A key barrier to installing insulation is the high up-front costs and the difficulty of transferring insulation to a new rental property if the tenant moves.

Federal Labor's Low Emission Plan for Renters outlined in the 2007 election campaign is a welcome measure (ALP 2007). It will be important to monitor the extent to which insulation is installed in dwellings rented by low-income households. Under the plan, landlords will be eligible for a 'rebate of 30 per cent of the cost of installing insulation, up to a maximum rebate of $500 per property' (ALP 2007).

In New Zealand, landlords with low-income tenants are eligible for a rebate of up to 55 per cent of the cost of the insulation under the EnergyWise Home Grants. Conditions include:

- The property must have been built before 1978.
- The property should have insufficient ceiling and/or underfloor insulation.
- The tenant named on the tenancy agreement must be eligible for a community services card.
- Rent must not be raised within six months of receiving the subsidy. (EECA 2007b)

The New Zealand Government also offers a scheme for home owners, which provides either:

- an interest subsidy, so homeowners can pay off over time the cost of energy efficiency improvements, and the government will pay the interest, up to a maximum of $1250
  or
- a grant, of 10 per cent of the cost of insulation and clean heat, up to a maximum of $500. (EECA 2007a)

Low-energy heating and cooling

Low-energy heating and cooling should be considered in conjunction with appropriate levels of insulation and weather sealing.

In many households where gas heating is not available, the use of inefficient and expensive portable electric heaters dramatically increases energy consumption. In colder climates, consideration should be given to incentives for landlords to install gas heating in households which currently have none available.

Low-energy fridges and appliances

Fridges and freezers produce approximately 9 per cent of household greenhouse gas emissions. Since they are usually owned by the renter and they can be easily transferred to a new rental property, fridges do not present the problem of split incentives associated with other residential energy efficiency initiatives.

Incentives to purchase low-energy appliances, including rebates and loans schemes, could be of particular interest to many low-income households.

Maintaining and retrofitting old fridges can provide cost and greenhouse gas savings. The Sustainable Energy Authority of Victoria (SEAV 2004) highlighted low or no-cost measures which can improve operational efficiency of existing refrigerators. These included:

> … cleaning the condenser coils, shielding or locating the refrigeration equipment away from heat sources, defrosting regularly, repairing damaged or dislocated door seals, adjusting the operating temperature of the units etc. (SEAV 2004, p.25)

The SEAV study estimated a conservative 25 per cent energy saving from such measures. Support could be provided to maintain and retrofit low-income households' current refrigerators which are in satisfactory condition.

The Brotherhood of St Laurence and the Moreland Energy Foundation run the Phoenix Fridge program which retrofits unwanted fridges and sells them to low-income households at low cost. One of the big benefits from the scheme is that it makes efficient fridges affordable for low-income households. Such a program could be expanded through local governments.

A further useful measure is reducing the use of second fridges (or beer fridges). A number of programs, such as the Fridge Buyback scheme operating in metropolitan Sydney, provide incentives to collect and recycle second fridges.

Compact fluorescent lamp (CFL) retrofits

CFL retrofits are a relatively inexpensive method of reducing household energy consumption. The Australian Government aims to phase out incandescent light bulbs by 2009–2010 (DEWHA 2008).

The Department of the Environment, Water, Heritage and the Arts (2008) estimates annual savings of around $50 per household, and national savings of 4 million tonnes of greenhouse gas emissions and around $400 million, from the transfer to CFLs. This saving is possible because:

> CFLs use around 20 per cent of the energy to produce the same amount of light, because they waste far less energy creating heat. In addition, they can last between four and 10 times longer than the average incandescent light bulb. (DEWHA 2008)

CFL bulbs are considerably more expensive to purchase than incandescent bulbs. As such, additional support should be provided to low-income households who cannot afford the CFL bulbs, even though the bulbs will yield savings over the life of the product. In some states, this support may be connected to market-based incentive schemes such as the Victorian Energy Efficiency Target (VEET) scheme.

Housing affordability and household energy expenditure

Recommendation 7: The definition of 'affordable housing' in national affordable housing goals needs to include broader costs related to housing and in particular associated energy and transport costs.

Energy use is a fundamental part of a household budget. Expanding the definition of affordable housing to include household energy use will provide a clearer understanding of the links between the thermal characteristics of a particular dwelling (design, hot water service, etc.) and a household's energy consumption and expenditure.

Incorporating energy usage into the definition of affordable housing will also highlight the need for measures to enable low-income households to reduce energy consumption.

Similarly, transport choices are often related to housing location and access to transport options. Low-income families face high transport costs because of locational disadvantage (associated with cheaper rents and public housing availability), including distance from public transport, family members and amenities, and reliance on old, inefficient motor vehicles.

Energy efficiency and new rental properties

Recommendation 8: The National Rental Affordability Scheme (NRAS) and the Housing Affordability Fund (HAF) provide opportunities for federal, state and local governments to improve the energy and environmental performance of new housing. Improved energy and environmental performance will provide long-term benefit for the tenants, and raise standards for the market. High standards should be made a condition of funding under these programs.

Recommendation 9: Additional funding for energy efficiency initiatives under NRAS and HAF should come from outside the housing budget. Possible sources include emissions trading scheme auction revenue and state and federal environment budgets.

National Rental Affordability Scheme (NRAS)

In response to the increasing scarcity of affordable rental properties, the federal Labor government has promised to implement a new National Rental Affordability Scheme (ALP 2007a). The scheme is broadly similar to the National Affordable Rental Incentive (NARI) proposed by the National Affordable Housing Summit (NAHS 2007). It is based on a series of incentives for investors who build affordable rental housing and are then required to rent the housing at 20 per cent below market rates of equivalent properties in the area.

Improved environmental standards, particularly energy and water efficiency, should be made conditions for participation in the national affordable rental initiative.

There are several benefits of such a step. Firstly, improving the energy efficiency of new homes is more cost-effective than retrofitting existing homes: there will be higher greenhouse gas savings per dollar invested. Secondly, for the low-income renter, more efficient homes should lead to reduced energy consumption and therefore decreased expenditure on energy as a proportion of the household budget. This will further reduce housing stress. Thirdly, requiring such standards in new houses built under the NRAS will also provide showcases of affordable housing built to higher environmental standards. This is likely to place upward pressure on industry energy efficiency

standards. Finally, incorporating energy efficiency criteria into the NRAS will also stimulate the demand for energy-efficient building materials and household products.

Housing Affordability Fund

The proposed Housing Affordability Fund (HAF) is also designed to address the affordable housing shortage by reducing supply-side barriers. The fund will address the cost of developing new infrastructure (for example water, sewage and transport) for new homes, and the 'holding costs' associated with planning and approval delays (ALP 2007b).

Once operational, local councils working with developers will submit proposals for HAF funding into a competitive bidding process. The proposals will have to identify reductions in infrastructure development costs and reductions in red tape.

As with the NARI initiative, the federal government should incorporate environmental standards in the criteria to access the Housing Affordability Fund. Including energy efficiency criteria for specific households and for entire developments will lead to reduced greenhouse gas emissions and reduced household expenditure. It will also stimulate demand for energy-efficient products and services.

Funding for initiatives

Funding for such sustainability initiatives should not be restricted to the housing budget. Rather there is a need to look beyond the already stretched housing budget to see the linkages to other functional areas. The aim of such funding should be to assist Australian households to be 'ETS-ready'.

New programs to promote energy efficiency in low-income households

Recommendation 10: A flexible suite of programs needs to be available to support low-income renters to be more energy-efficient. Current programs need to be substantially expanded. Appropriate actions include:

- **improved mandatory housing standards**
- **large-scale energy auditing and rebate programs**
- **federal and state tax incentives to encourage landlords to invest in energy efficiency**
- **council incentives (such as fast-track processing or advice)for improved energy and environmental performance by developers**
- **improved information about the energy efficiency of rented properties (potentially mandatory before the lease is signed).**

In the 2007 election campaign, federal Labor made commitments to developing household energy efficiency. Measures included a rebate for residential insulation specifically targeting rental properties, as well as green loans, a 'one-stop green shop' and climate-friendly hot water.

It will be important to ensure that low-income private tenants can take full advantage of these measures. International experience suggests that specific mechanisms will be needed for that to occur.

In particular, low-income households are less likely to be able to take out loans unless there are specific provisions for them; and low-income private renters are unlikely to utilise schemes which apply only to fixtures such as solar hot water systems. Measures to encourage the participation of low-income households could include:

- applying schemes to high-energy transportable items such as refrigerators
- a quota (alongside other incentives) to ensure a certain percentage of loans or rebates go to low-income households
- offering the loans in conjunction with rebates.

Like the loans scheme, the 'One Stop Green Shop' should be designed to enable low-income households to participate. Materials and advice services should be provided which target low-income private renters. Attention should also be paid to consolidating the available information for landlords and investors in rental properties.

Improved mandatory housing standards

Improved mandatory housing standards have the potential to increase household energy efficiency. In recent years most states and territories (Australian Capital Territory, South Australia, Victoria, Western Australia and New South Wales) have adopted five-star new residential building standards.

There is scope to further improve standards. The Nationwide House Energy Rating Scheme (NatHERS 2007), for example, is an initiative of the Ministerial Council on Energy which provides a framework that allows various computer software tools to rate the potential energy efficiency of Australian homes and incorporates a system of ratings up to 10 stars. In the United Kingdom, the government has foreshadowed a target of 'zero carbon' homes by 2016 (see DCLG c.2007). Zero carbon homes would have zero net emissions of carbon dioxide from all energy use.

State and federal governments should progressively lift mandatory housing standards, which should cover major renovations as well as new homes. As noted above, schemes such as the NRAS should also be used to place upward pressure on household energy efficiency standards.

Housing standards do not generally cover existing homes. One way to encourage market pressure for improved energy efficiency is to require energy information to be disclosed at the time of sale. Such a regulation already exists in the ACT. This could provide a basis for mandatory star ratings of all households in the future.

Improved information about the energy performance of rented properties

It would also be useful to consider a national system for alerting renters to the energy efficiency of a property they are considering leasing. This could be mandatory for a new lease.

The technical skills to generate household energy ratings already exist through the NatHERS framework (and similar schemes such as Basix in NSW) and the various approved home energy rating software such as AccuRate, BERS Professional and FirstRate 5.

A business case for such a regulation should be prepared, taking into account its benefits and the costs of providing this information.

In developing guidelines for disclosing energy efficiency of rental properties, it will be essential to link the changes with incentives for landlords to improve the energy efficiency of low-cost rental housing. There are already incentives in the form of tax deductions and capital depreciation claims, which need to be explored and promoted further. Also needed are regulations which reduce the potential for energy efficiency improvements to increase price pressure on residential rents.

Large-scale energy auditing and rebate programs

A number of energy audit and retrofit programs operate in Australia. These make an important contribution, but there is clearly scope to develop the programs. Recent Australian program experience includes:

- The Victorian Energy and Water Taskforce (formerly Victorian Energy Taskforce) which targets energy poverty in low-income households. In 2006–07 the taskforce predicted that it would retrofit 1269 homes. Since commencing in 2003, it had retrofitted over 4500 households, but this represents less than one per cent of the potential target group (SV 2006).

- A similar program in South Australia, the Energy Efficiency Program for Low Income Households, operated from December 2003 until December 2006. Its aim was 'to reduce financial hardship faced by low-income households as a result of rising energy costs' and its objectives included reducing greenhouse gas emissions (DTEI 2006, p.3). The program provided free home energy audits and a basic retrofit service. This was complemented by two sub-schemes—one to buy back inefficient fridges and another to offer interest-free loans to fund the purchase and installation of energy-saving products.

International experience suggests that schemes can be operated on a larger scale. Examples include:

- The **Weatherization Program**, a long-running federally funded program in the United States designed to decrease the energy burden on low-income households by improving household energy efficiency. It services around 100,000 homes per year and will have weatherized over 1.2 million homes between 2002 and 2010 (USDoE 2008b). Eligible households are audited by trained crews who determine the most cost-effective measures for each home. The relevant measures are then implemented free of charge.

  The average expenditure is approximately USD2600 per household (USOBM 2007). The program results in average household energy bill reductions of USD358 per year (USDoE 2007). Detailed evaluations suggest that every dollar of federal funding returns around USD2.60 in energy and non-energy benefits (USDoE 2003).

  In 2008, the US Department of Energy will provide USD228 million to the Weatherization program; this represents about 40% of total program funding. The remaining funds will come from 'Federal programs that serve low-income families such as the Low-Income Home Energy Assistance Program (LIHEAP), state agencies, utilities, settlements from lawsuits, and other private-sector interests such as landlords of buildings receiving weatherization services' (USDoE 2008a).

  The Weatherization Program's formula for allocating funds incorporates:

    - how many low-income households live in each state (expressed as a proportion of the national total of low-income households)
    - the climatic conditions in each state (indicating the amount of energy needed and number of days heating and cooling are required)
    - an approximation of residential energy expenditures by low-income households in each state (USDoE 2006).

- The **Warm Front** program in England targets households suffering from fuel poverty. Households receive a comprehensive audit and retrofit. In 2004–05 the program serviced some 140,000 households; and it was expected to service 1.3 million households between 2000 and 2006. Similar programs run in Scotland, Wales and Northern Ireland.

  The Fuel Poverty Advisory Group (BERR 2008, pp.14–15) outlined the budget and benefits of the scheme:

  > In 2007/8 Warm Front expenditure is £350m. Over the 3 years … from April 2008 to March 2011, expenditure will be £800m or £267m p.a. on average in money terms, equivalent to £250m p.a. in real 2007/08 terms.
  >
  > Warm Front has been an exceptionally successful scheme:
  > - It has reduced fuel bills for low-income customers – by £200 p.a. or 20% in 2006 and there are comfort gains in addition.
  > - It has reduced CO2 emissions in a very cost effective way. According to the DEFRA 2006 evaluation of the 2000 Climate Change Programme, it was one of the most effective carbon saving mechanisms across all sectors.

- It has always spent the money allocated to it through its success in finding eligible customers.

In Australia, key measures that should be undertaken to improve the schemes include:

- increasing the number of households able to access the programs
- increasing the depth of measures undertaken in each household
- developing monitoring systems to quantify the financial, greenhouse and energy savings in each household
- reviewing the targeting of the schemes and ensuring they reach the households most in need, including those facing hardship paying their bills.

Market-based schemes

Market-based schemes such as the NSW GGAS scheme and the forthcoming Victorian Energy Efficiency Target scheme can also assist a transition to more efficient housing.

The Victorian Energy Efficiency Target scheme (VEET), which will commence on 1 January 2009, introduces a statutory obligation on energy retailers to ensure householders reduce emissions.

At this stage the scheme does not have specific provisions for low-income households, or for low-income renters. The UK scheme on which the VEET is based, the Carbon Emissions Reduction Target (CERT) employs quotas which require at least 40 per cent of carbon savings to be generated in priority group households, which are either low-income or elderly consumers (DEFRA 2008). The development of the CERT, which commenced in April 2008, included doubling the level of activity of its predecessor, the Energy Efficiency Commitment. The CERT is expected to deliver:

> overall lifetime carbon dioxide savings of 154 MtCO2 – equivalent to annual net savings of 4.2MtCO2 by 2010, and equivalent to the emissions from 700,000 homes each year – and will stimulate about £2.8 billion of investment by energy suppliers in carbon reduction measures. (DEFRA 2008)

While there has been some difficulty filling the CERT quotas, it is important to develop mechanisms to enable low-income households to take part, rather than accept their exclusion from the program.

Federal and state tax incentives to encourage landlords to invest in energy efficiency

Federal and state governments should investigate further tax incentives to promote energy efficiency improvements in low-rental housing.

The AGO provides basic information on tax deductions for energy efficiency improvements in rental properties. Deductions are currently available for:

- replacing hot water system with a more energy-efficient variety
- installing efficient water fixtures such as low-flow taps and AAA-rated shower heads
- installing an energy-efficient heating or cooling system
- installing double-glazed windows
- installing blinds and awnings
- erecting pergolas or similar external shading devices
- installing doors for zoning of heating and cooling
- rewiring a property, including improving lighting controls, zoning and lighting type
- purchasing energy-efficient appliances
- installing insulation (AGO c.2007b).

There is a need to disseminate information to investors on the existing opportunities for tax deductions.

Also important is providing clear information about the relationship between government rebates, such as those in the new rental insulation rebate scheme, and tax deductibility. The Australian Tax Office has specific rulings regarding the relationship between rebates and tax deductibility for capital works (see ATO 2006). To promote increased uptake of these initiatives, it would be useful to bring together the information in one place and provide simple explanations to assist small investors.

Council incentives for improved energy and environmental performance by developers

Local councils and state governments should consider incentives (such as fast track processing or advice) for developers to improve energy and environmental performance.

Engaging the players

Recommendation 11: Potential major players in the private rental sector need to be engaged in discussions and measures to assist low-income private renters. These include large investors, superannuation funds, industry associations (including real estate industry peak bodies and professional associations), bodies corporate, financiers and developers. Government funding programs affecting these groups could have conditions attached that require improved energy efficiency and/or support for low-income renters.

The Australian private rental market is shifting from investors who own a small number of properties to larger scale investors. As this shift occurs, there will be significant opportunities to develop new mechanisms to assist low-income private renters to access more energy-efficient housing. The shift to large scale investors will reduce the difficulties inherent in seeking to encourage changes by numerous very small investors. Facilitating meetings between the major players could lead to innovative means to improve energy efficiency in affordable housing.

Joint ventures

Recommendation 12: There are opportunities for joint ventures involving electricity retailers and financiers (banks) to provide funding and support for improved energy efficiency in private rental accommodation. This could reduce up-front costs to tenants for energy-efficient appliances (e.g. fridges) or heating and cooling solutions (e.g. insulation) by having tenants pay off the cost in instalments with savings made from reduced future energy bills. Governments should play a facilitating role and banks and financiers should be urged to develop a range of such joint ventures.

Partnerships between electricity retailers and financiers to make household energy efficiency measures more affordable have the potential to reach more households and increase the resources available. Governments can play a key role in facilitating such ventures. Care will be needed to develop measures which balance the needs of low-income households with commercial imperatives and societal goals.

Energy tariffs: reforming perverse incentives

Recommendation 13: Energy tariff structures need to take account of low-income renters, for example by removing perverse incentives like high fixed charges in electricity bills that discourage energy efficiency.

Review high fixed energy charges

High fixed charges act as a disincentive to adopt energy-efficient measures and behaviour. Where a higher fixed charge is applied, the unit price for energy is likely to be lower. Higher fixed charges are regressive.

The Australian Greenhouse Office (1998) analysed the impact of different combinations of fixed (supply) charges and unit supply process on three different households: a small, energy-efficient household (1,000 kWh p.a.), a typical gas-using household (4,000 kWh p.a.), an average Australian household (6,000 kWh p.a.), and a large electricity user (10,000 kWh p.a.). Under the various pricing scenarios, there is no change in the total electricity cost to the average household and as a result no change to the electricity supplier's revenue (AGO 1998). There are, however, dramatic changes in costs for the various households (see graph in Appendix). If the $15/quarter and $90/quarter supply charge scenarios are compared, the following may be noted (AGO 1998, p.12):

- the financial saving from reducing electricity consumption by one kilowatt-hour declines from 12 cents to 7 cents when the supply charge is increased, which is a 42% reduction: this reduces the cost-effectiveness of energy efficiency measures and fuel-switching
- for the small, energy-efficient household, annual electricity cost more than doubles, from $180 to $430 per year
- for the large consumer, annual electricity cost falls by 16%, from $1,260 to $1,060
- the unavoidable supply charge reaches $360 per year, and is 84% of the total bill of the small, energy-efficient household, making its average effective electricity cost 43 cents per kWh, compared with an average cost of 10.6 cents per kWh for the large consumer.

In Victoria, the 2008 fixed prices range between $39 per quarter and $54 per quarter, depending on the retailer and tariff. Table 1 gives some examples of residential supply charges in Victoria.

Table 1: Examples of Victorian residential supply charges (GST inclusive) 2008

	TRUenergy	Origin (Powercor)	AGL (North)	Units
Residential tariffs GD and GR [b] ***only (GST incl)***				
Supply charge ($ per quarter)	45.00	46.684	40.15 [a]	$/quarter
Residential tariffs GD and GR [b] ***with off peak dedicated circuit (GST incl)***				
Supply charge ($ per quarter)	50.6	46.684	40.15 [a]	$/quarter
GH/GL 'Winner tariff' [c]				
Supply charge	53.9	46.684	40.15 [a]	$/quarter

[a] Quarterly charge based on 44.00 cents/day; calculation: (0.44 x 365)/4 = $40.15
[b] GD and GR – general residential tariffs
[c] Winner tariff (residential) is an optional off-peak tariff where any electrical appliance used between 11 pm and 7 am Monday to Friday, and all day Saturday and Sunday, runs at the off-peak rate. At all other times, electricity is charged at a higher cost.
Sources: *Victoria Government Gazette*, nos. S 306, S 307, S 308.

Review declining block energy tariffs

Tariff structures which include reductions as consumption increases (referred to as declining block tariffs) further undermine energy efficiency measures. Declining block tariffs benefit high energy users, while low-income households who generally use less energy are disadvantaged.

Social tariff

The idea of a social tariff is receiving considerable attention. A social tariff would provide a set basic amount of energy at a low cost. For usage beyond this, the tariff would increase.

Hardship obligations in the National Energy Framework

Recommendation 14: 'Hardship' obligations, which require retailers to provide support for people facing difficulties paying energy bills, should be placed on retailers in the National Energy Framework, along the lines existing in Victoria.

Many low-income households already face significant difficulties paying their utility bills.

The Victorian Government's hardship policies provide an effective framework to address households' difficulties paying utility bills. The hardship obligations require energy retailers to include the following tools in their hardship programs:

- flexible payment arrangements
- flexible options for the purchase or supply of replacement electrical/gas appliances/equipment for domestic use
- energy auditing services wholly or partly at the expense of the retailers
- processes for the early detection of customers facing difficulty in paying energy bills.

The National Energy Framework should include retailers' obligations such as those contained in the Victorian hardship obligations.

Body corporate regulations

Recommendation 15: Regulations and by-laws that discourage energy efficiency should be reviewed and where appropriate abolished. For example, body corporate (or strata scheme) rules that prohibit the hanging of washing on lines should be removed.

A growing number of households are governed by body corporate or strata schemes. In Victoria, for example, there are over 65,000 bodies corporate with 480,000 lots; and the number is increasing by 2000 each year (CAV 2006). Large bodies corporate (greater than 20 lots) are relatively few in number—around 4 per cent of the total—but represent 45 per cent of all lots (CAV 2006). Significantly, there are only 650 really large bodies corporate (over 100 lots), yet they make up around 25 per cent of all lots (CAV 2006).

Body corporate regulations and by-laws which relate to common property elements affect members' individual and shared energy usage and can impinge on measures to increase energy efficiency or reduce energy consumption.

The Australian Greenhouse Office (c.2007a) has outlined the key ways that common property regulations can affect energy usage:

1. Common property elements and regulations governing individual or common property can impact on individual energy usage, for example:
- availability (or lack of) clothes lines and regulations which restrict the use of clothes lines
- installation of external fittings including awnings and blinds
- installation of pergolas for shade
- landscaping (planting of trees and shrubs to provide shade).

2. Reducing the energy use within individual dwellings often requires permission from the body corporate. For example this may apply to:
- installing blinds or awnings
- replacing hot water systems.

3. Common property elements also use energy, for example:
- lighting (e.g. stairwells, car parks, pools)
- heating and cooling (e.g. gyms, pools and meeting areas)
- laundry facilities.

A review of body corporate and strata title by-laws and regulations needs to be undertaken to identify which by-laws and regulations constrain energy efficiency measures. Attention should also be given to measures that could assist members to reduce their energy consumption. Model body corporate laws should be adapted in line with the review.

Information on household energy efficiency for rental properties

Recommendation 16: Clear information should be provided to landlords, tenants and others like bodies corporate on the opportunities for improved energy efficiency in private rental properties.

Clear information on the opportunities for improved energy efficiency will complement other measures to promote residential energy efficiency.

A significant body of work already exists (see, for example, AGO 2000). There is however a need to review, develop and distribute this information.

Steps to improve the access to, and distribution of, existing information include:
- developing an information hub for residential energy efficiency, with specific sections for households, renters, investors, bodies corporate. This would be similar to federal Labor's 'One Stop Green Shop' 2007 election commitment.
- partnering with relevant agencies and industry bodies to facilitate the flow of information.

It may also be useful to develop new information which targets specific sectors and key players. Within this process it will be important to recognise different motivations and how these may affect action. Specific information is needed for:
- *small investors:* Small investors currently make up around 60 per cent of the private rental market. Their large number makes it difficult and expensive to reach them. Information needs to be developed to link the benefits from household improvements to the diverse factors motivating their investment (for example, rental return or long-term investment).
- *Bodies corporate:* Materials should include specific information for large and very large bodies corporate.

Urban planning and design

Recommendation 17: Urban planners need to take greater account of climate change and warming factors, since they play a critical role in determining how low-income households are affected. Key issues include the design of new houses and suburbs, urban sprawl and access to public transport. Poor public design can exacerbate the impact of climate change. Black roads, dark roofing and lack of trees increase urban temperatures by up to 1.5 degrees.

Although the multiple and complex interactions between urban planning and climate change are beyond the scope of this report, some key points are noted here.

For all households and low-income households in particular, urban planning has a significant effect on energy usage.

Transport options are closely connected to urban planning and account for 36 per cent of an average household's greenhouse gas emissions—even more in households with multiple cars and where public transport options are limited.

Urban planning also has an impact on household energy consumption. Poor urban design can exacerbate the impacts of climate change and urban heat island effects and lead to higher temperatures in urban environments. Measures which increase urban heat include black roads, dark roofing and a lack of trees, which increase urban temperatures by up to 1.5 degrees. Linacre and Geerts (1998), for example, argue that in the last 100 years the effect of black roads, dark roofs and lack of tree cover has raised the ambient temperatures in Australian cities by approximately 1.5 degrees, while climate change has only raised it by approximately 0.5 degrees.

Local councils and state agencies need to change their standard planning rules, specifications and road designs to achieve the following outcomes as part of maintenance and capital works programs:

- pale-coloured tar instead of black tar
- trees shading roads
- pale roofs instead of black roofs.

Appendices

1 Roundtable participants

The Hon. John Thwaites	
Professor Julian Disney	Social Justice Project, UNSW
Mr Tony Nicholson	Brotherhood of St Laurence
Ms Esther Abram	Sustainability Program Consultant
Mr David Brown	Lend Lease Development
Ms Kate Colvin	VCOSS
Mr Michael Cooney	Per Capita
Dr Mark Diesendorf	Institute of Environmental Studies, UNSW
Ms Rebecca Falkingham	Office of Climate Change, Department of the Premier and Cabinet
Ms Alyssa French	Committee for Melbourne
Mr Stephen Gatford	Office of the Energy and Water Ombudsman (Victoria) Ltd
Ms Wendy Heath	Essential Services Commission
Mr Mike Hill, Director	WestWyck
Mr Craig Johnston	Shelter NSW
Councillor Judith Klepner	Member of the VLGA Climate Change Working Group
Mr Michael Mobbs	Sustainable Projects and Design Pty Ltd
Mr Jeff Moon	Brotherhood of St Laurence
Mr Adam Mooney	ANZ Bank
Mr Simon Rowntree	Brotherhood of St Laurence
Ms Cathleen Sherry	Faculty of Law, UNSW
Mr Tim Sonnreich	Advisor for Climate Change to The Hon. Gavin Jennings, MLC
Dr Janet Stanley	Brotherhood of St Laurence
Mr Damian Sullivan	Brotherhood of St Laurence
Mr Julian Turecek	Origin Energy
Dr Ian Winter	AHURI
Mr James Golden	Principal Policy Analyst, Energy and Earth Resources Policy Division, Department of Primary Industries

2 Definitions of households

Definitions of household types are taken from NIEIR (2007). Refer to NIEIR 2007 for a full explanation of the categories and definitions of all twenty household types.

Working age security dependent family type one

The characteristics of social security dependent family type 1 are set out below. The principal source of household income is derived from the following:

1. disability support pension
2. unemployment benefits
3. education and sickness benefits
4. other government pensions and benefits
5. zero weekly income from work
6. some other private income
7. the household has dependent children
8. not a retired household (that is age of household head is not greater than 55)
9. no household member works.

Poor family households

Poor households are a sub-set of Type 1 households, with the exception that at least four of the following conditions are met:

- could not afford to have a night out once a fortnight, or
- could not afford brand new clothes, or
- spends more money than receives, or
- could not afford to pay gas, electricity or telephone bills, or
- pawned or sold something, or
- went without means, or
- was unable to heat the home due to a shortage of money, or
- had cash flow problems during the past year.

Poor households make up the bulk of the social security dependent family household Type 1. This household type constitutes 76 per cent of household Type 3.

Age pension household

The household receives a Veterans Affairs pension, age pension or overseas pension or benefit.

Low-skilled household

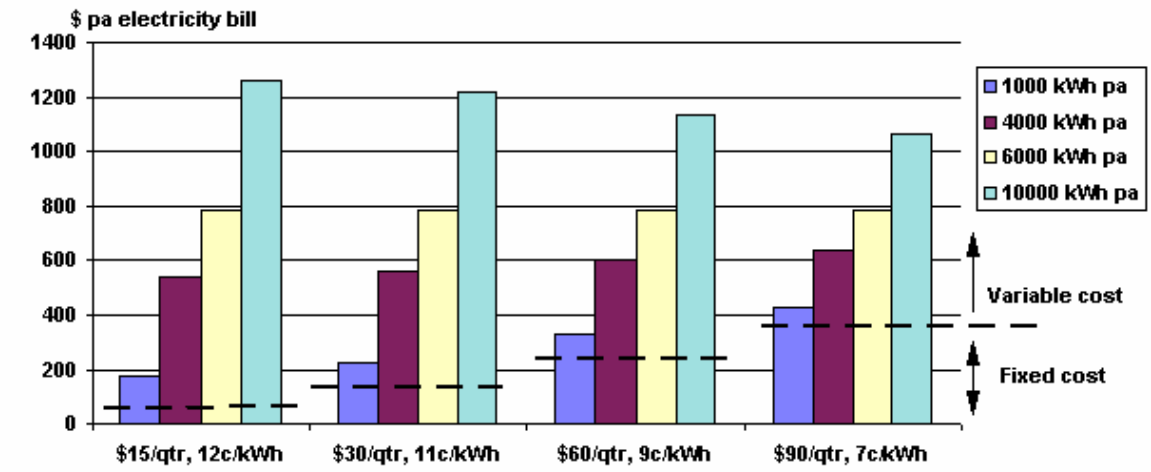
Household with no post-school qualifications.

High-income tertiary-educated household

Household where household head has tertiary qualification and also relatively high income.

3 Effects of fixed charges and unit prices on electricity bills

The figure below shows the effects on annual electricity bills if quarterly charges are increased and unit price decreased, for small to large consumers.



Source: Australian Greenhouse Office (1998), p.12.
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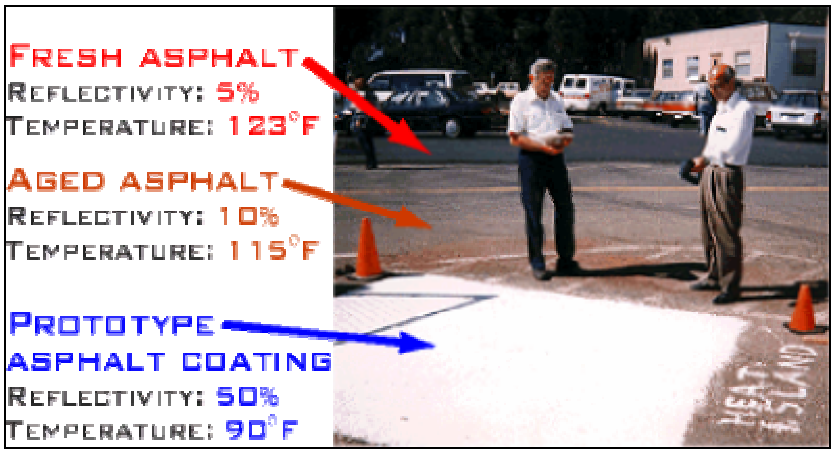
4 Reflective pavements

The Heat Island Group has tested the temperature difference made by reflective pavements.



The photo shows the measuring of the temperatures of three pavements outside a laboratory in California. The albedos were measured at the same time. The prototype asphalt coating was developed in collaboration with Reed & Graham, Inc. of San Jose, California.
Source: Heat Island Group (1999)

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