Brotherhood
of St Laurence
Working for an Australia free of poverty

Submission in response to

A Climate of Opportunity Summit Paper

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Victorian Government Department of Premier and Cabinet

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Summary

This submission focuses on the opportunities presented by climate change for improving social inclusion through greater workforce participation; improved public transport; more affordable housing that is more liveable due to energy efficiency retrofitting, and appropriate climate change adaptation planning and support.

Low-income households, the Carbon Pollution Reduction Scheme and rising costs of living

In 2010, when the CPRS is introduced, the prices of electricity, petrol, and gas will rise. The effect in turn will flow through to the price of all goods and services. Given that energy and fuel costs make up a higher proportion of low-income households' weekly income, these people will be hit the hardest.

The Brotherhood of St Laurence is committed to helping low-income households adjust to the rising costs of electricity and other living expenses.

We are currently partnering with KPMG in a significant research project investigating which energy efficiency measures are the most cost-effective for reducing electricity costs for low-income and vulnerable households and reducing greenhouse gas emissions. The research will propose the most effective mechanisms to deliver such measures. It will also assess the economic impacts of increased energy prices on low-income households and the likely economic outcomes of a large-scale energy efficiency household retrofit program.

Key barriers to reducing energy use and saving money

Key barriers that need to be overcome to realise energy, money and greenhouse gas emissions savings include:

- high up-front costs of energy efficiency measures
- information barriers
- transaction costs and lack of trust in information or suppliers
- split incentives for private renters.

A well-designed set of policies which create incentives to take up energy efficiency measures, and which target low-income households and landlords of low-income housing, could address these barriers.

Key opportunities for lowering energy use in low-income housing

Auditing the energy use of low-income households and retrofitting for energy efficiency would have triple benefits of reducing the financial impacts of the CPRS, reducing fuel poverty and reducing greenhouse gas emissions. Retrofits should include installing:

- low-energy hot water systems
- low-energy, more efficient heating and cooling solutions including insulation
- low-energy fridges and appliances
- compact fluorescent lamps.

This upgrading of housing stock could be achieved through measures such as:

- 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)
- market-based schemes such as the Victorian Energy Efficiency Target scheme, with mandatory obligations on retailers to generate a minimum proportion of credits from low-income households.

Increasing the climate change resilience of the state's regions and communities

To ensure the resilience of vulnerable Victorians to climate change, the government should:

- undertake research on and provide structural adjustment for adapting agriculture and water systems for a prolonged state of lower rainfall
- research the implications and requirements arising from climate change for planning and housing regulations and standards, particularly for cheaper housing
- invest in an Adaptation Future Fund, which should be used to 'climate proof' infrastructure and housing, particularly that of low income earners.
- invest in a Rescue Future Fund, earmarked for supporting and eventually relocating people exposed to climate change, such as coastal communities.
- further develop the 'Beat the Heat' heatwave program to provide both energy-efficient air conditioning in the housing of older citizens and education targeted at these people, their carers and their families, teaching them how to cope in heatwave conditions.

Green jobs and training opportunities

Responding to climate change in Australia provides significant opportunities to increase prosperity though job creation and addressing skills shortages.

New green job opportunities and new green skills requirements will arise in construction, public transport, manufacturing, agriculture, education, research and development, and in retrofitting homes and appliances for energy and water efficiency. The government should provide training for disadvantaged job seekers and for today's workers so that they can meet this new demand.

To harness this opportunity, the Victorian Government must begin now to research, plan, develop policy, and invest in retraining and jobs required in our transition to a low carbon future.

Comprehensive, efficient and affordable public transport systems

Responding to climate change provides opportunities to increase social inclusion through greater transport options which enable people to participate in society.

This requires containing urban sprawl and dramatically improving people's access to time-efficient, comprehensive and affordable low carbon transport options. Public transport is a crucial part of this picture.

In expanding and improving the public transport network, there is a significant opportunity to address locational disadvantage that occurs when there is a gross undersupply of transport options in low-income outer suburbs and regional areas. Low-income households already have less choice about where they live, whether due to the shortage of public housing and long waiting lists for accommodation close to their work or family, or due to the lack of affordable rental and sale properties near transport, shopping or employment hubs. We now have an even greater imperative to address this situation. Dependence on heavily polluting cars cannot be sustained; and clean, low carbon transport is a must.

We cannot rely on the carbon pollution reduction scheme (CPRS) to drive all the shifts required to achieve a low carbon society. Complementary policies will be needed, especially investment in public transport. Because of the long lead times in putting in place public transport infrastructure and systems, the government must start to plan and invest in public transport now.

Introduction

The Brotherhood of St Laurence (BSL) is a Melbourne-based community organisation that has been working to reduce poverty in Australia since the 1930s. Our vision is 'an Australia free of poverty'. Our work includes direct service provision to people in need, the development of social enterprises to address inequality, research to better understand the causes and effects of poverty in Australia, and the development of policy solutions at both national and local levels.

We welcome this opportunity to contribute ideas to Victoria's response to climate change.

The three complementary principles upon which Victoria's response to climate change should be based are equity, environmental effectiveness and economic efficiency.

Victoria's response should place specific emphasis on and identify the means to::

- reduce low income households' vulnerability to climate change by increasing their capacity to adapt to changing climatic conditions and reducing their vulnerability to increased prices for energy, fuel and other services. Low-income households are particularly vulnerable to both the physical effects of climate change, such as increased heat waves, and to policy responses to it, such as energy price increases resulting from an emission trading system—and the flow-on effect on other goods and services (see BSL 2007).
- make Victoria a significant contributor to greenhouse gas emissions reductions, both directly, and by showing leadership which may influence national and international debate
- provide Victoria with significant economic and employment opportunities
- reduce the need for more stringent measures to address climate change as a result of delayed action.

Interaction between federal, state and local governments

A key challenge for Victoria's response to climate change will be to ensure coherence between different levels of government. The Brotherhood is a strong advocate of energy efficiency measures for low income households as part of the compensatory measures connected to the national Carbon Pollution Reduction Scheme (CPRS). It is our view that the state government will have an important role to play in delivering such energy efficiency programs. However the nature of that delivery will, at least in part, depend on the federal government response.

General aspects

The Victorian Government response to climate change should identify appropriate strategies and mechanisms to enable the state to respond to climate change. These measures should include:

- short to medium-term targets (mitigation) including sectoral targets
- a Victorian adaptation plan
- regular review, monitoring, evaluation and public reporting of the social impacts of climate change
- institutional mechanisms for monitoring and reporting on climate change targets (or budgets); and overseeing the climate change adaptation plan; such as a climate change committee or roundtable.

The government should also identify a review of all relevant regulations and legislation with a bearing on climate change. Specific attention should be paid to the impacts of climate change and climate change mitigation measures on low income households.

Responses to selected Summit Paper questions

1 Assisting households to adjust to the rising costs of electricity, fuel and other commodities

The Brotherhood of St Laurence is committed to helping low-income households adjust to the rising costs of electricity and other living expenses.

We are currently partnering with KPMG in a significant research project investigating which energy efficiency measures are the most cost-effective for reducing electricity costs for low-income and vulnerable households and reducing greenhouse gas emissions. The research will propose the most effective mechanisms to deliver such measures. It will also model the economic impacts of increased energy prices on low-income households and the likely economic outcomes of a large-scale energy efficiency household retrofit program. The report will be released in September.

Low-income households, the Carbon Pollution Reduction Scheme and rising costs of living

In 2010 when the CPRS is introduced, the price of electricity, petrol and other fuels will rise, and the effect will flow through to the price of all goods and services. Given that basic energy and fuel costs make up a higher proportion of low-income earners' weekly incomes, they will be hit the hardest.

Research conducted by the National Institute for Economic and Industry Research (2007) for the Brotherhood of St Laurence looked at both the direct costs of carbon pricing on energy prices and the embedded costs of all household goods and services. It showed that without compensating factors, pricing carbon at $25 per tonne would add 2.3 per cent to the annual cost of living for poor Australian households. Pricing carbon at $50 per tonne would add 4.6 per cent to those same Australian budgets (NIEIR 2007).

This is because low-income households spend a larger share of their average weekly income on utilities (electricity, gas and water) than do high-income households (NIEIR 2007; Garnaut 2008). A poor family household spends approximately 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, although the total expenditure is greater in the higher income household (NIEIR 2007). Similarly, Garnaut (2008) found that the proportion of income spent on transport fuel, gas and electricity is around 9.5 per cent for low-income households, and around 4.5 per cent for upper-income households. Therefore, low-income households will be disproportionately affected by price rises.

There will be additional increased costs, 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 of agricultural products and consequently increased food prices (NIEIR 2007).

Research by the Climate Institute also indicates that while low-income households spend less on fuel compared with higher income households, they spend more as a proportion of their income (Hatfield-Dodds & Denniss 2008).

Therefore, in discussing how best to assist households to adjust to the rising costs of electricity, fuel and other commodities, it is important to prioritise the needs and analyse the impacts on those most vulnerable to the rising costs—namely, low-income households.

◆ What is stopping people from realising opportunities to reduce their energy use and save money?

A series of barriers have been identified to households reducing their energy usage. These include:

- high up-front costs of energy efficiency measures
- information barriers
- transaction costs and lack of trust in information or suppliers
- split incentives for private renters.

Barriers to low-income and vulnerable households

Low-income and vulnerable households face similar but magnified barriers to reducing their energy usage and more generally responding to climate change.

The Brotherhood of St Laurence (2008) has focused our attention on the barriers faced by low-income private renters to improving their household's energy efficiency. Many barriers also exist for other households, particularly low-income home owners and people living in public housing.

Access to household energy efficiency for low-income and vulnerable households should be considered in the context of other stressors they face, particularly housing affordability stress.

Whether they are home owners struggling to meet mortgage repayments after years of interest rate rises, or private tenants facing rising rents associated with the affordable housing supply crisis, such households are at risk of being unable to pay their utility bills (CfM 2007). Price increases resulting from the CPRS, and from other impacts of climatic change, will place a further burden on already stressed low-income householders.

In recognition of the important linkage between housing affordability and energy efficiency, a recent Brotherhood roundtable on low-income households in the private rental market and the emissions trading scheme recommended that:

> 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 (BSL 2008).

Barriers faced by low-income and vulnerable households in adopting more energy efficiency measures include:

- Limited resources to meet up-front costs of energy efficiency measures

Many low-income households cannot afford the up-front payments to purchase energy saving products. Even at the time of replacement of existing appliances many households do not have the additional money to spend on more efficient appliances.

- Split incentives between landlords and tenants

A key barrier for low-income renters to reduced energy use is the 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 lower energy bills. While renters will receive the benefit, they are unlikely to be able or willing to pay the considerable up-front cost of energy efficiency measures, particularly when they have limited security of tenure.

- Residual end of the housing market

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

- Information and knowledge barriers

Like others, low-income households may have limited knowledge about the most energy-efficient and cost-effective purchases. Overcoming this knowledge barrier can be costly in time and energy.

- Low levels of grant, rebate and loan scheme uptake by low-income households

Specific attention should be paid to whether the programs that aim to make reducing energy use more affordable provide sufficient incentives to enable low-income households to benefit.

◆ How can we develop the capacity of individuals and households to reduce their energy bills through energy efficiency measures and behaviour change?

In May 2008, the Brotherhood of St Laurence (2008) released the report, *Enabling low-income households in the private rental market to respond to climate change*, which discussed recommendations arising from a roundtable convened in December 2007. This report details many key opportunities for lowering energy use in private rental housing and overcoming the barriers listed above. Among low-income groups, private renters have been identified as facing particular barriers in responding to energy price increases. However, many of the recommendations are also appropriate to other low-income households, and thus are presented below. (The full report can be found in the supporting materials to this submission.)

New programs to promote energy efficiency in low-income households

The roundtable identified the needs:

> A flexible suite of programs is needed to support low-income renters, in particular, 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).

- **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. In the United Kingdom, for example, the government has foreshadowed a target of 'zero carbon' homes by 2016 (DCLG c.2007). Zero carbon homes would have zero net emissions of carbon dioxide from all energy use.

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 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 (NatHers 2007) 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 the 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 for further development. 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 has retrofitted over 4500 households, but this represents less than one per cent of the potential target group (SV 2006).

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 2008c). 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 US$2600 per household (USOMB 2007). The program results in average household energy bill reductions of US$358 per year (USDoE 2007). Detailed evaluations suggest that every dollar of federal funding returns around USD$2.60 in energy and non-energy benefits (USDoE 2003).

  In 2008, the US Department of Energy will provide USD$228 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’ (US DoE 2008c).

  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 2006a).

- 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 was £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 and public reporting systems to quantify the financial, greenhouse and energy savings in each household and at aggregate level (see, for example, United Kingdom National Audit Office 2008)
- 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 (VEET) scheme, NSW Energy Efficiency Target (NEET) scheme and South Australia's REES can also assist a transition to more efficient housing. The 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).

From an equity perspective, the problem with the VEET model, which lacks a priority group, is that it is regressive. Energy retailers will incur costs as they meet their obligations they will then pass the costs of the scheme onto all their customers. All customers, including low-income and vulnerable households, will pay more for energy. However, low-income households are unlikely to get the benefits of the VEET. Wealthier households will be able to contribute more to reduce their emissions. Providers will naturally seek to generate credits in the households which cost the providers the least to reduce emissions. The result is likely to be a much higher rate of take-up in higher income households than low-income households.

The VEET scheme should be carefully monitored and results reported publicly. Monitoring should include information on the uptake of initiatives by household type, income group and other measures of vulnerability such as concession entitlements.

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

The Victorian Government should consider the most suitable tax incentives to encourage landlords to improve energy efficiency within their properties. If the most suitable measures relate to federal taxes, the Victorian Government should work with the Australian and other state governments to achieve the most effective and equitable changes.

There is also a need to disseminate information to investors on the existing opportunities for tax deductions, including clear information about the relationship between government rebates, such as those in the new rental insulation rebate scheme, and tax deductibility.

In developing new schemes or expanding existing schemes to support uptake of energy efficient measures, the Victorian Government must:

- pay greater attention to ensuring the most cost-effective measures are employed in each scheme, and to understanding how low-income households use energy
- ensure comprehensive coverage of energy efficiency needs. For example, programs should include non-fixed appliances such as fridges, washing machines and fans or evaporative coolers, because such provisions can be taken up by renters
- develop a quota (alongside other incentives) to ensure a significant percentage of loans or rebates go to low-income households
- offer no-interest loans in conjunction with rebates for low-income households to increase uptake
- target the promotion of schemes to increase low-income earner uptake.

Other measures identified

Other measures to assist low income households respond to climate change include:

- 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.
- There are opportunities for joint ventures involving electricity retailers and financiers (banks) to provide funding and support for improved energy efficiency in low-income accommodation. This could reduce up-front costs for energy-efficient appliances (e.g. fridges) or heating and cooling solutions (e.g. insulation) by having residents 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.

- 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.
- Clear information should be provided to landlords, tenants and others like bodies corporate on the opportunities for improved energy efficiency in private rental properties.
- Energy tariff structures need to take account of low-income households, for example by removing perverse incentives like high fixed charges that discourage energy efficiency.
- '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. (The roundtable noted that such obligations should be based on those operating in Victoria.)

Key opportunities for lowering energy use in low-income housing

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 (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 vulnerable households will require additional support to implement them. The measures outlined in the roundtable report include:

- **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.

- **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, attending to 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.

- **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. Barriers to installing insulation are the high up-front costs and the difficulty of transferring insulation to a new rental property if the tenant moves.

The Victorian Government should consider increasing the subsidy provided by the federal government to ensure the needs of low-income households are met.

- **Low-energy heating and cooling**

Low-energy heating and cooling should be considered in conjunction with appropriate 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 energy-efficient 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. 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.

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 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; and 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. 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 might be connected to market-based incentive schemes such as the Victorian Energy Efficiency Target (VEET) scheme.

◆ What mechanisms should the Victorian Government adopt and advocate at a national level to ensure that socially-disadvantaged communities and households are supported through the transition to the ETS?

In designing the Emissions Trading Scheme and complementary measures, the interests of low-income households, particularly private renters, need to be specifically considered and addressed. The research conducted for the Brotherhood of St Laurence by the NIEIR (2007) has identified the regressive impact of an emissions trading scheme. Similar studies have identified smaller yet similar regressive impacts (DCC 2008).

Well-targeted assistance to mitigate the impacts of the CPRS on low-income and vulnerable households is essential. The Brotherhood is currently undertaking a research project to identify the most cost effective assistance package for low-income and vulnerable households. The project focuses on cost-effective energy efficiency improvements which can be delivered on a large scale.

The Victorian Government should, however, support strong and ambitious short and medium term emission reduction targets. This is important for all Victorians, particularly low-income households and socially excluded Victorians who are at the greatest risk from any negative impacts of climate change. They have poorer housing, fewer resources, less insurance and less social support networks to adapt to the impacts. Therefore, deep cuts in emissions must be pursued now to minimise the risk. The Garnaut Review will suggest, based on detailed modelling, the necessary emissions

reductions up to 2020. The Victorian Government should support caps on emissions for the CPRS and emission targets based on the best available science.

To ensure an effective and efficient ETS, the Victorian Government should support full auctioning of permits, with a substantial share of anticipated revenue from the auction used to assist low-income and vulnerable households reduce their energy use before the CPRS comes into effect. This is preferred over price subsidies or financial compensation for low-income households, since compensation tends to be eroded over time. However, the Victorian Government should advocate provision of some direct compensation which will be required while energy efficiency measures are introduced, particularly for the lowest income and most vulnerable households. This assistance should be as simple as possible and tied to the current tax and transfer system.

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.

2 Increasing the climate change resilience of the state's regions and communities

- Where are the state's most vulnerable regions, communities and individuals to climate change? What groups and communities may need particular assistance in developing new skills?
- Beyond uncertainty of impacts, what are the factors in Victoria's vulnerable communities currently standing in the way of adaptation to climate change?
- How can the Victorian Government better assist our regions to make the link between better understanding of economic impacts and actions to address key impacts?
- How can the Victorian Government effectively respond to the increase in the frequency of extreme events (such as drought and bushfire) that climate change will bring?

The Victorian Government can take important steps to build the resilience of communities, particularly vulnerable and disadvantaged communities. One is to invest in future adaptation requirements, and in some cases, to begin the adaptation process. We believe the following are priorities:

- Undertake research on and provide assistance for adapting agriculture and water systems to prolonged periods of lower rainfall. In order to secure the livelihoods of rural communities, itinerant workers and employees in agricultural processing (such as in abattoirs or packing factories), we must learn to be productive in the new climatic regime now. We cannot afford to have circumstances where emergency relief is required to become a matter of routine. We must give farmers the tools they need to adjust to low rainfall and higher temperatures, whether it be through education and support to shift crop production, training on efficient water use, or infrastructure for low-water production.
- Plan for climate change in low-income housing design. Begin research into the implications and requirements for planning and housing regulations and develop legislation which ensures all new housing, particularly public housing and affordable rental properties, is built to cope with the changing climate.
- Invest in an Adaptation Future Fund. This fund should be used to 'climate proof' infrastructure and housing, particularly low-income housing where residents cannot afford repairs in response to increased frequency and severity of storms, floods, bushfires, drought and high temperatures.

- Invest in a Rescue Future Fund. This fund should be earmarked for supporting and eventually relocating climate change exposed communities, such as Gippsland coastal townships built on sand dunes and by river estuaries. These low-income communities are at a high risk of being eroded away and severely damaged by floods, sea-level rise and storm surges. They will need to be relocated, and supported during the transition.
- Further develop the 'Beat the Heat' heatwave program. The existing program should be expanded to provide and install energy efficient air conditioning systems in aged care facilities, retiree public housing and pensioners' houses, to ensure the well-being of older Victorians. It should also involve an education component for these people and their families, teaching them how to respond in the case of a heatwave. In 2003 in Europe, some 30,000 people, mostly older citizens, died prematurely during a heatwave. We must avoid a similar tragedy in Australia, by being well prepared for the impact of rising temperatures.

3 Positioning Victorian industry to capitalise on the new jobs, new technologies and new markets that will flow from the transition to the low carbon economy

- What are the international, national and local opportunities that may emerge from the transition to a low carbon economy?
- What are the current and emerging skill requirements and how might they be best addressed?

Responding to climate change in Australia provides significant opportunities to increase prosperity though job creation and addressing current and upcoming skills shortages. We need a human capital plan to ensure that people trying to get a foothold in the world of work, those in vulnerable industries and those who need to upgrade their skills gain the qualifications they need to succeed in a sustainable economy. This will require significant research and planning, so the Victorian Government should start now to invest in our low carbon future. It also needs to begin a dialogue about equitable transition with communities with high levels of employment in emission-intensive industries.

For the purpose of this submission we will use the following working definition of green jobs:

> Green jobs are positions in a variety of industries, including agriculture, manufacturing, research and development, administrative, and service activities, aimed at alleviating environmental problems. In particular, this includes jobs that help to protect and restore ecosystems and biodiversity, reduce energy consumption, decarbonise the economy, and minimise or altogether avoid the generation of all forms of waste and pollution (White & Walsh 2008).

Green jobs and training opportunities

New green job opportunities will arise in construction, public transport, manufacturing, agriculture, education, research and development, and in retrofitting homes and appliances for energy and water efficiency. The Dusseldorp Skills Forum (DSF) and the Australian Conservation Foundation (ACF) commissioned research that projects overall employment growth of between 2.6 and 2.7 million jobs by about 2025 and between 3.3 and 7.5 million by 2050 under an Emissions Trading Scheme (Hatfield-Dodds et al. 2008). Total employment in Australia is expected to increase from 9.7 million jobs today to around 16.7 million by 2050 with little variation between high, medium and low emission reduction scenarios (Hatfield-Dodds et al. 2007). Many of these jobs will be green jobs. The DSF and ACF (2008) also anticipate that it will be necessary to identify and

provide green skills to the 3.25 million workers in industries that currently have 'high environmental impact'.

To meet the challenge of this significant change, we must identify green job growth areas and training needs, devise incentives for sustainable business development, create a supportive policy environment, and invest in human capital to avoid skills shortages. Today human capital is regarded as the most valuable component of the economic wealth of nations, accounting for more than 75 per cent of the total asset base of high-income nations like Australia (Hatfield-Dodds et al. 2008). By employing new knowledge, skills and technology, we can mitigate climate change while increasing living standards and employment growth.

The Brotherhood of St Laurence (BSL) has not identified the training needs for green jobs. However, as part of Victoria's response to climate change it will be important for the government to:

- review current and projected future need for workers in climate change related industries
- review the relevance of state education and training to meet these needs particularly through the Vocational Education and Training system.

Job growth and skills development in residential energy efficiency

Of particular interest to the Brotherhood of St Laurence are the job opportunities in auditing and retrofitting of low-income housing. Expanding current schemes such as Sustainability Victoria's Energy and Water Taskforce (EWTF) would be a big step forward in generating green jobs. The EWTF aims to audit and retrofit public housing with energy efficient products and appliances. Since 2003, it has retrofitted over 4500 households, but these represent less than one per cent of the potential target group (SV 2006).

A key aspect of the EWTF is training disadvantaged job seekers and managing workers to carry out these retrofits. The BSL is directly involved in providing these services. Other community welfare organisations, such as Kildonan, are involved in household energy efficient programs through the Energy Hardship program. To achieve larger scale benefits, not only in terms of job creation, but also in terms of greenhouse gas reductions and reduced energy costs for low-income households, we need to increase the number of households reached by these programs and the energy savings per household.

The employment benefits of expanding such a scheme are demonstrated in similar international programs such as the Warm Front program in England and the Weatherization program in the United States. The Weatherization program, which employs and trains workers to retrofit homes and businesses to lower heating and cooling bills, has provided services to more than 5.6 million low-income families (USDoE 2008a). The US Department of Energy estimates that for every $1 million invested in weatherization programs in low-income communities, 52 jobs are created there. Further, Weatherization retrofits reduce heating bills by 32% and overall energy bills by $US358 per year on average at current prices ((USDoE 2006b).

Expanding Australian retrofit programs to audit and retrofit *all* low-income houses with energy efficiency measures would generate a significant number of new jobs in auditing and retrofitting and in related sectors. The Victorian Government should pursue training for and rollout of such a program now, to insulate low-income households against the price impacts of the Carbon Pollution Reduction Scheme (CPRS) *before* they occur and to stimulate the energy efficiency market, create economies of scale and equip workers for affordable and timely uptake of similar services by households not targeted by such schemes.

Expanding these programs could also require significant retraining of today's workforce.

Other areas of job growth

Other significant employment opportunities arising from climate change mitigation and adaptation policies include increased demand for renewable energy stimulated by the mandatory renewable energy target (MRET) and shifts towards less carbon intensive industries.
Another area with potential job growth is the recycling and retrofit of appliances through programs like the Brotherhood of St Laurence's Phoenix Fridge project. This project is an innovative approach to tackling the inefficiency of household fridges which are major contributors to ozone depletion, climate change, waste disposal, and landfill limitations. The project provides skills and training to repair, retrofit and recycle old refrigerators. Not only does the project reduce greenhouse gas emissions, and increase energy efficiency, but also it generates green jobs for disadvantaged job seekers most in need of support in securing a job.

4 Supporting an ETS with complementary measures that smooth the transition for the Victorian economy (including the built environment and transport infrastructure)

The Brotherhood of St Laurence recognises that the CPRS will not drive all the changes required for a comprehensive response to climate change. Other responses required will include improved energy efficiency standards for new and existing building standards, major investment in infrastructure, for example public transport infrastructure, and urban design reform. Numerous legal, regulatory and other administrative barriers also need to be addressed in facilitating a transition to a low carbon society. The Victorian Government must begin now to address such reforms.

- **What changes to how we live across our cities and towns are we willing to accept? Urban form, building design, streetscapes, street layout, mix of densities, the way we deliver energy and water services, and where we can develop may all need to change. What are the essential elements we want to maintain as we adapt our settlements to a low carbon profile?**

Social inclusion through efficient, affordable public transport and effective urban design

Changes in transport and urban design have the potential to mitigate greenhouse gases and at the same time promote social inclusion. Accessible transport options enable people to participate in society, whether it is through meeting with friends and family, attending community activities or simply interacting with others at the local shops. Containing urban sprawl, increasing access to and affordability of public transport and other local services, increasing the amount of affordable housing in the inner suburbs, and improving the liveability of houses and local areas will increase social inclusion of many disadvantaged and isolated Victorians.

Carbon usage and transport choices

Responding to climate change requires dramatically improving people's access to time-efficient, comprehensive and affordable low carbon transport options. Public transport is a crucial part of this picture. In expanding and improving the public transport network, there is a significant opportunity to address the locational disadvantage that occurs where there are too few transport options in low-income outer suburbs and regional areas. Low-income households have less choice about where they live, whether due to the shortage of public housing and long waiting lists for accommodation close to their work or family, or due to the lack of affordable rental and sale properties near transport, shopping or employment hubs.

The impact of access to comprehensive public transport on spending and on the production of greenhouse gas emissions by low-income households was demonstrated in the Brotherhood of

St Laurence's recent report (Unkles & Stanley 2008). This report revealed that low-income households with the highest carbon use tend to be in the outer metropolitan areas of Melbourne, particularly Melton, Brimbank, Yarra Ranges and Cardinia, while carbon use is lower in local government areas (LGAs) closer to the CBD. The likely explanation for this difference is the variability of accessible public transport. The poor residents of LGAs with high carbon use generally have a relatively low expenditure on public transport, but a correspondingly greater expenditure on private vehicles (Unkles & Stanley 2008). It is also worth noting that within these areas there are fewer high order service centres such as hospitals, medical specialists, government offices and technical specialists, necessitating travel to obtain these services.

The average annual use of CO2 per Victorian for regional LGAs is much higher than in metropolitan Melbourne. The LGAs where the estimated average CO2 use for poor households is more than 10% higher than the Victorian average for this household type are West Wimmera, Golden Plains, Yarriambiack, Loddon, Hindmarsh and Buloke. One common feature of these LGAs is the absence of a major service centre and the limited public transport. Hence residents need to travel long distances by car to meet anything greater than the immediate local service needs. In each of these areas, petroleum product purchases account for over 4% of total expenditures, compared with a Victorian average of 3.4% for this type of household. Similarly, expenditure on the purchase of motor vehicles (4.3% to 5.8%) exceeds the Victorian average of 3.4% (Unkles & Stanley 2008).

This mapping exercise indicates the spatial variation in carbon use, even for households with similar incomes. The problem of mobility for poor households is compounded in some LGAs by lack of local specialist services and shopping and business centres. Improving transport and local service provision will not only help to reduce greenhouse gas emissions by transport, but also reduce the disadvantage of low-income households who are forced to spend a higher proportion of their income on transport and the disadvantage of people living in regional communities where access to services is limited.

In improving public transport infrastructure, it will be crucial to ensure that the services cater for the needs of elderly people and people with disabilities. This will help allow these Victorians to enjoy greater participation in social and economic activities in their community.

Carbon usage and urban design

Urban sprawl makes people more reliant on greenhouse gas emitting vehicles and causes many people to be without sufficient access to local services. Responding to climate change demands rethinking of urban planning, particularly with respect to location of services, so that people do not have to use energy travelling long distances to meet their needs. This also important in the location of affordable housing. Increasingly, public housing and affordable rental housing is concentrated focused in outer suburbs. The effort to make more housing available for low-income households in inner suburbs needs to be advanced quickly to meet the needs of a growing population and to address the housing shortage.

References

Australian Greenhouse Office 2007, *Tax deductions for energy efficiency improvements in rental properties*, Australian Greenhouse Office, viewed 29 July 2008, <http://www.environment.gov.au/settlements/local/publications/pubs/brochure5.pdf>.

Australian Tax Office 2006, *Income tax: is a government rebate received by a rental property owner an assessable recoupment under subsection 20-20(3) of the Income Tax Assessment Act 1997 , where the owner is not carrying on a property rental business and receives the rebate for the purchase of a depreciating asset (for example an energy saving appliance) for use in the rental property*, Taxation Determination: TD 2006/31, <http://law.ato.gov.au/atolaw/view.htm?docid=TXD/TD200631/NAT/ATO/00001>.

Brotherhood of St Laurence (BSL) 2008, *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*, Brotherhood of St Laurence, Melbourne.

Committee for Melbourne (CfM) 2004, *Utility debt spiral project*, viewed 3 December 2007, <www.cuac.org.au/docs/Committee%20for%20Melb%20Utility%20Debt%20Spiral%20Report%20Nov04.pdf>.

Department for Business Enterprise and Regulatory Reform (BERR) 2008, *Fuel Poverty Advisory Group (for England) sixth annual report 2007*, United Kingdom Government, viewed 17 April 2008, <http://www.berr.gov.uk/files/file45365.pdf>.

Department for Environment, Food and Rural Affairs (DEFRA) 2006, *Synthesis of climate change policy evaluations*, DEFRA, UK, viewed 3 December 2007, <http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/synthesisccpolicy-evaluations.pdf>.

—— 2008, *Energy supplier obligations: Carbon Emissions Reduction Target (CERT)*, DEFRA, UK, viewed 28 March 2008, <http://www.defra.gov.uk/environment/climatechange/uk/household/supplier/cert.htm>.

Department of Climate Change (DCC) 2008, *Carbon Pollution Reduction Scheme Green Paper July 2008*, Australian Government Department of Climate Change, Canberra.

Department of Communities and Local Government (DCLG) c.2007, *Zero carbon homes*, Department of Communities and Local Government, UK, viewed 10 January 2008, <http://www.communities.gov.uk/planningandbuilding/theenvironment/zerocarbonhomes/>.

Department of the Environment, Water, Heritage and the Arts (DEWHA) 2008, *Phase-out of inefficient light bulbs*, DEWHA, Canberra, viewed 11 February 2008, <www.greenhouse.gov.au/energy/cfls/index.html>.

Dusseldorp Skills Forum (DSF) and Australian Conservation Foundation (ACF) 2008, *Growing the green collar economy: skills and labour challenges in reducing our greenhouse emissions and national environmental footprint: executive summary*, Dusseldorp Skills Forum & Australian Conservation Foundation, viewed 7 August 2008, <http://www.acfonline.org.au/uploads/res/GreenCollar_ExecS_web.pdf>.

Garnaut, Ross 2008, *Draft Report June 2008*, Garnaut Climate Change Review. Viewed 29 July 2008, <http://www.garnautreview.org.au/CA25734E0016A131/pages/draft-report>.

Hatfield-Dodds, S & Denniss, R 2008, *Energy affordability, living standards and emissions trading: assessing the social impacts of achieving deep cuts in Australian greenhouse emissions*, report to The Climate Institute, CSIRO Sustainable Ecosystems, Canberra <http://www.climateinstitute.org.au/images/hatfield-dodds%20and%20denniss%202008%20energy%20affordability.pdf>.

Hatfield-Dodds, S, Jackson, E K, Adams, P D & Gerardi, W 2007, *Leader, follower or free rider? The economic impacts of different Australian emission targets, prepared for* The Climate Institute, viewed 7 August 2008, <http://www.climateinstitute.org.au/images/stories/CI058_ER_FullReport_NEW.PDF>.

Hatfield-Dodds, S, Turner, G, Schandl, H & Doss, T 2008, *Growing the green collar economy: skills and labour challenges in reducing our greenhouse emissions and national environmental footprint*, Report to the Dusseldorp Skills Forum, CSIRO Sustainable Ecosystems, Canberra, viewed 28 July 2008, <www.csiro.au>.

National Institute of Economic and Industry Research (NIEIR) 2007, *The impact of carbon prices on Victorian and Australian households*, report prepared for the Brotherhood of St Laurence, <www.bsl.org.au/pdfs/NIEIR_Impact_of_carbon_prices_on_Vic&Aust_households_final_May2007.pdf>.

Nationwide House Energy Rating Scheme (NatHERS) 2007, *NatHERS: Nationwide house energy rating scheme website*, viewed 3 December 2007, <http://www.nathers.gov.au/index.html>.

Sustainability Victoria (SV) 2006, *Our little book of big ideas* [Annual report 2006–2007, book one], Sustainability Victoria, Melbourne, viewed 7 August 2008, <http://www.sustainability.vic.gov.au/resources/documents/SV_2006_07_AR_Book_One.pdf>.

Sustainable Energy Authority Victoria 2003, *National Framework for Energy Efficiency: preliminary assessment of demand-side energy efficiency improvement potential and costs*, prepared by G Armstrong for the Sustainable Energy Authority Victoria, viewed 3 December 2007, <http://www.nfee.gov.au/public/download.jsp?id=185>.

— 2004, *Energy efficiency improvement in the residential sector*, prepared by EMET Consultants for the Sustainable Energy Authority Victoria, viewed 3 December 2007, <http://www.nfee.gov.au/public/download.jsp?id=192>.

United Kingdom National Audit Office 2008, *Programmes to reduce household energy consumption: report by the Comptroller and Auditor General, HC 787 Session 2007-2008, 2 July 2008*, United Kingdom National Audit Office, London, viewed 7 August 2008, <http://www.nao.org.uk/publications/nao_reports/07-08/0708787.pdf>.

Unkles, B & Stanley, J 2008, *Carbon use in poor Victorian households by local government area*, Brotherhood of St Laurence, <www.bsl.org.au/pdfs/Unkles&Stanley_Carbon_use_poor_Vic_households_by_LGA.pdf>.

United States Department of Energy 2003, *Non energy benefits of weatherization*, Energy Efficiency and Renewable Energy, USDoE, viewed 29 July 2008 <www.eere.energy.gov/weatherization/ne_benefits.html>.

—— 2006a, *Weatherization allocation formula*, Energy Efficiency and Renewable Energy, USDoE, viewed 29 July 2008, <http://www.eere.energy.gov/weatherization/allocation_formula.html>.

—— 2006b, *Weatherization Assistance Program: improving the economies of low-income communities*, USDoE, viewed 11 July 2008, <http://www.eere.energy.gov/weatherization/improving.html>.

—— 2007, *Weatherization program*, Energy Efficiency and Renewable Energy, USDoE, viewed 11 July 2008, <http://www.eere.energy.gov/weatherization/>.

—— 2008a, *About the Weatherization Assistance Program*, Energy Efficiency and Renewable Energy, USDoE, viewed 31 July 2008, <http://www.eere.energy.gov/weatherization/about.cfm>.

—— 2008b, *Sources of funding for the weatherization assistance program*, Energy Efficiency and Renewable Energy, USDoE, viewed 11 July 2008, <www.eere.energy.gov/weatherization/prog_goals.html>.

—— 2008c, *Weatherization program goals*, Energy Efficiency and Renewable Energy, USDoE, viewed 11 July 2008, <http://www.eere.energy.gov/weatherization/prog_goals.html>.

United States Office of Management and Budget (USOMB) 2007, *Detailed information on the Weatherization Assistance Assessment*, Expectmore.gov website, USOMB, <http://www.crispexi.net/omb/expectmore/detail/10000128.2003.html>.

White, S & Walsh, J 2008, *Greener pathways: jobs and workforce development in the clean energy Economy*, Center on Wisconsin Strategy, The Workforce Alliance, The Apollo Alliance, Madison, viewed 28 July 2008, <http://www.greenforall.org/resources/greener-pathways-jobs-and-workforce-development-in/download>.

Wilkenfeld, G A 2004, *NFEE – Energy efficiency improvement potential case studies, residential water heating*, report to the Sustainable Energy Authority Victoria by George Wilkenfeld & Associates, viewed 11 July 2008, <http://www.nfee.gov.au/public/download.jsp?id=191>.

Supporting materials

(see following pages)

Brotherhood of St Laurence 2008, *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.*

National Institute of Economic and Industry Research 2007, *The impact of carbon prices on Victorian and Australian households*, report prepared for the Brotherhood of St Laurence.

Unkles, B & Stanley, J 2008, *Carbon use in poor Victorian households by local government area*, Brotherhood of St Laurence.

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).

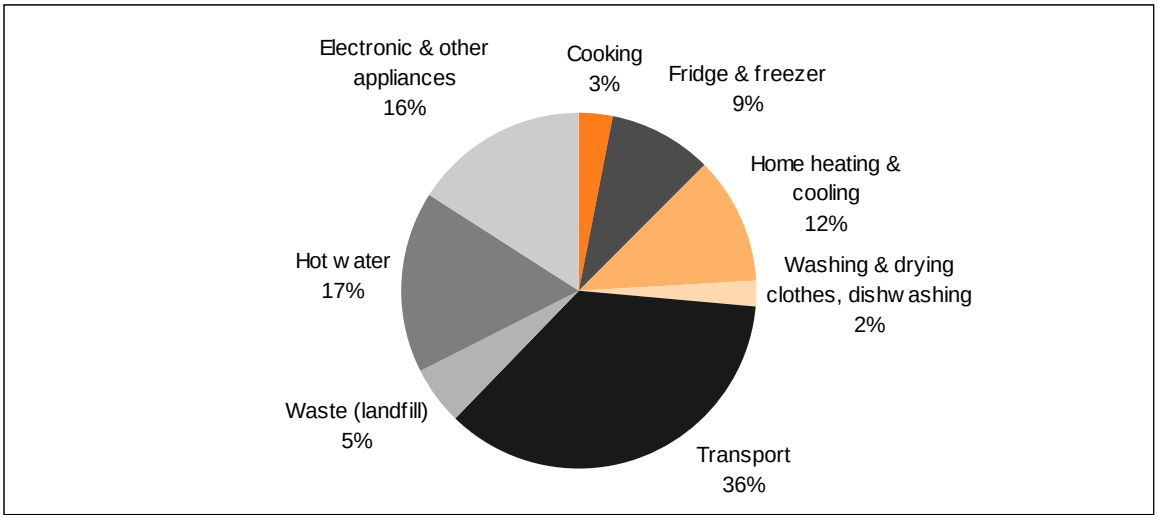
Energy efficiency measures can be undertaken in both new and existing households and many are relevant to all income groups. However, low-income private renters will require additional support to implement them.

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

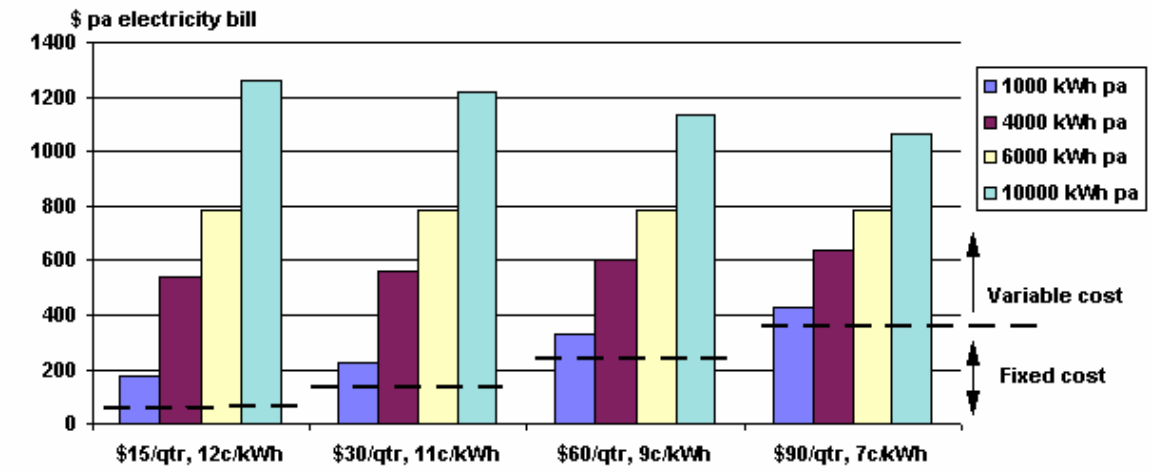
Household with no post-school qualifications.

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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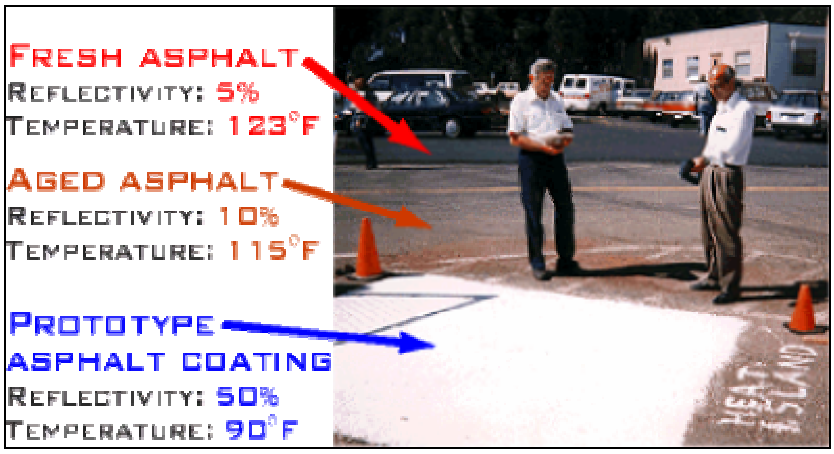
4 Reflective pavements

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)

References

Australian Greenhouse Office (AGO) 1998, *Strategic study of household energy and greenhouse issues*, prepared by Sustainable Solutions Pty Ltd for Environment Australia, viewed 25 March 2008, <http://www.energyrating.gov.au/library/pubs/pears-ago1998.pdf>.

—— 2000, *Motivating home energy action - a handbook of what works*, prepared by Michelle Shipworth, viewed 22 April 2008, <http://www.environment.gov.au/settlements/local/publications/motivating.html>.

—— 2007, *An assessment of the need to adapt buildings for the unavoidable consequences of climate change*, final report to the Australian Greenhouse Office, Department of the Environment and Water Resources, by BRANZ Limited, viewed 10 December 2007, <http://www.greenhouse.gov.au/impacts/publications/pubs/buildings-report.pdf>.

—— (c.2007a), *Reducing energy use in body corporate or strata properties*, viewed 22 April 2008, <http://www.environment.gov.au/settlements/local/publications/pubs/brochure7.pdf>.

—— (c.2007b), *Tax deductions for energy efficiency improvements in rental properties*, viewed 22 April 2008, <http://www.environment.gov.au/settlements/local/publications/pubs/brochure5.pdf>.

Australian Labor Party (ALP) 2007a, *Federal Labor's National Rental Affordability Scheme*, media statement 13 August, viewed 9 January 2008, <www.alp.org.au/media/0807/mshoulootre130.php?mode=print>.

—— 2007b, *Federal Labor to invest $500 million in housing plan saving homebuyers up to $20,000 on new homes*, media statement 30 July, viewed 9 January 2008, <http://www.alp.org.au/media/0707/msloo300.php?mode=print>.

Australian Tax Office (ATO) 2006, *Income tax: is a government rebate received by a rental property owner an assessable recoupment under subsection 20-20(3) of the Income Tax Assessment Act 1997 , where the owner is not carrying on a property rental business and receives the rebate for the purchase of a depreciating asset (for example an energy saving appliance) for use in the rental property, Taxation Determination: TD 2006/31*, viewed 10 February 2008, <http://law.ato.gov.au/atolaw/view.htm?docid=TXD/TD200631/NAT/ATO/00001>.

Brotherhood of St Laurence (forthcoming), Energy efficiencies to assist low-income household: conversation with Graham Arnold (working title).

Committee for Melbourne (CfM) 2004, *Utility debt spiral project*, CfM, viewed 3 December 2007, <www.cuac.org.au/docs/Committee%20for%20Melb%20Utility%20Debt%20Spiral%20Report%20Nov04.pdf>.

Consumer Affairs Victoria (CAV) 2006, *Final report of the body corporate review*, viewed 10 January 2008, <http://www.consumer.vic.gov.au/CA256902000FE154/Lookup/CAV_Publications_Bodies_Corporate/$file/BC_Final_Report_Jan_05.pdf>.

Department for Business, Enterprise and Regulatory Reform (BERR) 2008, *Fuel Poverty Advisory Group (for England) sixth annual report 2007*, viewed 17 April 2008, <http://www.berr.gov.uk/files/file45365.pdf>.

Department of Communities and Local Government (DCLG) (c.2007), *Zero carbon homes*, Department of Communities and Local Government, UK, viewed 10 January 2008, <http://www.communities.gov.uk/planningandbuilding/theenvironment/zerocarbonhomes/>.

Department for Environment, Food and Rural Affairs (DEFRA) 2006, *Synthesis of climate change policy evaluations*, DEFRA, UK, viewed 3 December 2007, <http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/synthesisccpolicy-evaluations.pdf>.

—— 2008, *Energy supplier obligations: Carbon Emissions Reduction Target (CERT)*, DEFRA, UK, viewed 28 March 2008, <http://www.defra.gov.uk/environment/climatechange/uk/household/supplier/cert.htm>.

Department of the Environment, Water, Heritage and the Arts (DEWHA) 2008, *Phase-out of inefficient light bulbs*, DEWHA, Canberra, viewed 11 February 2008, <http://www.greenhouse.gov.au/energy/cfls/index.html>.

Department of Primary Industries (DPI) 2007, *Victorian Energy Efficiency Target (VEET) scheme fact sheet*, DPI, Melbourne, viewed 3 December 2007, <http://www.dpi.vic.gov.au/dpi/dpinenergy.nsf/93a98744f6ec41bd4a256c8e00013aa9/8269dc63c5665fb5ca25738500158110/$FILE/VEET%20scheme%20fact%20sheet_Oct%202007.pdf>.

Department of Sustainability and Environment (DSE) (2007), *What you can do: at home*, Victorian Government's greenhouse web site, viewed 3 December 2007, <http://www.greenhouse.vic.gov.au/greenhouse/wcmn302.nsf/LinkView/2B608D774CDCF50DCA2570B40011701F20DE1E5C634C3EB7CA25702D001B6D4C>.

Energy Division, Department for Transport, Energy and Infrastructure (DTEI) 2006, *Evaluation of energy efficiency program for low-income households*, Energy Division, DTEI, South Australian Government report prepared by J Spoehr, K Davidson & L Wilson, Australian Institute for Social Research, viewed 3 December 2007, <http://www.dtei.sa.gov.au/__data/assets/pdf_file/0020/16832/eeplih_eval_report.pdf>.

Energy Efficiency and Conservation Authority (EECA) 2007a, *EnergyWise Home Grants*, EECA, Wellington, NZ, media release 29 October 2007, viewed 27 March 2008, <http://www.eeca.govt.nz/residential/energywise-home-grants/index.html>.

—— 2007b, *Landlords and low-income tenants to benefit from 55 percent insulation subsidy* Energy Efficiency and Conservation Authority, Wellington, NZ, viewed 27 March 2008, <http://www.eeca.govt.nz/news/media-releases/insulation-subsidy-for-landlords.html>.

Evans & Peck 2007, *Possible design for a national greenhouse gas emissions trading scheme: further definitions of the auction proposals in the NETT discussion paper*, prepared for the National Emissions Trading Taskforce, viewed 23 April 2008, <http://www.emissionstrading.net.au/__data/assets/pdf_file/0015/8421/Auction_Design_Report.pdf>.

Gurran, N 2007, *Climate change and environmental planning: where do we build houses?*, presentation to the Shelter NSW Climate Change and Low Income Housing Conference, Sydney, 15 November, viewed 3 December 2007, <http://www.shelternsw.infoxchange.net.au/docs/sem0711climatechange-gurran.zip>.

Heat Island Group 1999, *Reflective pavements are cooler*, Heat Island Group, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, University of California website, viewed 28 March 2008, <http://eetd.lbl.gov/HeatIsland/Pavements/Overview/Pavements99-05.html>.

Krbaleski, J (Director, Energy Investment and Sustainability) 2007, *Victorian Energy Efficiency Target Scheme* Powerpoint presentation, , viewed 3 December 2007, <http://www.dpi.vic.gov.au/dpi/dpinenergy.nsf/93a98744f6ec41bd4a256c8e00013aa9/8269dc63c5665fb5ca25738500158110/$FILE/VEET%20forum%20presentation%2031%20oct%2007.pdf>.

Linacre, E & Geerts, B 1998, *Changes of temperature in Sydney and in Australia*, notes, viewed 28 March, 2008, <http://www-das.uwyo.edu/~geerts/cwx/notes/chap15/sydney.html>.

McNicol, I 2004, Residential sector energy efficiency improvement potential, Sustainable Energy Authority, viewed 3 December 2007, <http://www.nfee.gov.au/public/download.jsp?id=207>.

National Institute of Economic and Industry Research (NIEIR) 2007, *The impact of carbon prices on Victorian and Australian households*, a report for the Brotherhood of St Laurence, viewed 28 March 2008, <http://www.bsl.org.au/pdfs/NIEIR_Impact_of_carbon_prices_on_Vic&Aust_households_final_May2007.pdf>.

National Affordable Housing Summit (NAHS) 2007, *Outline of the proposed national affordable rental incentive scheme (the NARI scheme)*, viewed 9 January 2008, <http://www.housingsummit.org.au/media/NARISOutline.pdf>.

Nationwide House Energy Rating Scheme (NatHERS) 2007, *NatHERS - Nationwide house energy rating scheme website*, viewed 3 December 2007, < http://www.nathers.gov.au/index.html>.

NSW Greenhouse Gas Abatement Scheme (NSWGGAS) 2003, *Case study accreditation of the EnergyAustralia residential energy efficiency refit program*, NSW Greenhouse Gas Abatement Scheme, viewed 3 December 2007, <http://www.greenhousegas.nsw.gov.au/documents/CS-DSA-EA.pdf>.

Randolph, B & Holloway, D 2007, 'Where do low-income private renters live?' *AHURI Research and Policy Bulletin*, no. 88, viewed 3 December 2007, <http://www.ahuri.edu.au/publications/download/rap_issue_88>.

Schweitzer, M 2005, *Estimating the national effects of the U.S. Department of Energy's Weatherization Assistance Program with state-level data: a metaevaluation using studies from 1993 to 2005*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, viewed 3 December 2007, <http://weatherization.ornl.gov/pdf/CON-493FINAL10-10-05.pdf>.

Schweitzer, M & Tonn, B 2002, *Non energy benefits from the weatherization assistance program: a summary of findings from the recent literature*, Oak Ridge National Laboratory, Oak Ridge, Tennessee, viewed 3 December 2007, <http://weatherization.ornl.gov/download_files/Con-484-april02.pdf>.

Sefton, T 2004, *Aiming high – an evaluation of the potential contribution of Warm Front towards meeting the Government's fuel poverty target in England*, viewed 3 December 2007, <http://www.eaga.com/downloads/pdf/Sefton_EagaPCT_FinalReport.pdf>.

Sherrard, J & Tate, A 2007, 'Equity in response to climate change roundtable: an Australian snapshot' in Brotherhood of St Laurence 2007, *Equity in response to climate change roundtable*, viewed 3 December 2007, <http://www.bsl.org.au/pdfs/Equity_in_Response_to_Climate_Change_Roundtable_report_2007.pdf>.

—— (forthcoming), A national Emissions Trading Scheme and low income households: discussion paper prepared for the Brotherhood of St Laurence roundtable, 11 April.

Victoria Government Gazette 2007, No. S 306, 30 November 2007, viewed 25 March 2008, <http://www.dse.vic.gov.au/DPI/dpinenergy.nsf/93a98744f6ec41bd4a256c8e00013aa9/544a191be1031ed6ca2573a9000a3522/$FILE/AGL_gazetted_tariffs_08.pdf>.

Victora Government Gazette 2007, No. S 307, 30 November, viewed 25 March 2008, <http://www.nre.vic.gov.au/DPI/dpinenergy.nsf/93a98744f6ec41bd4a256c8e00013aa9/544a191be1031ed6ca2573a9000a3522/$FILE/Origin_gazetted_tariffs_08.pdf>.

Victoria Government Gazette 2007, No. S 308, 30 November, viewed 25 March 2008, <http://www.dse.vic.gov.au/DPI/dpinenergy.nsf/93a98744f6ec41bd4a256c8e00013aa9/544a191be1031ed6ca2573a9000a3522/$FILE/TRU_gazetted_tariffs_08.pdf>.

Sustainable Energy Authority Victoria (SEAV) 2003, *National Framework for Energy Efficiency - preliminary assessment of demand-side energy efficiency improvement potential and costs*, prepared by G Armstrong for the Sustainable Energy Authority Victoria, viewed 3 December 2007, <http://www.nfee.gov.au/public/download.jsp?id=185>.

—— 2004, *Energy efficiency improvement in the residential sector*, prepared by EMET Consultants for the Sustainable Energy Authority Victoria, viewed 3 December 2007, <http://www.nfee.gov.au/public/download.jsp?id=192>.

Sustainability Victoria (SV) 2006, *Annual report 2006–2007*, Sustainability Victoria, viewed 3 December 2007, <http://www.sustainability.vic.gov.au/resources/documents/SV_2006_07_AR_Book_One.pdf>.

Toronto Environmental Alliance (TEA) 2006, *A low-income energy efficiency program: mapping the sector and program design principles*, report prepared for the Ontario Power Authority's Conservation Bureau, viewed 3 December 2007, <http://www.conservationbureau.on.ca/Storage/13/1834_Low_Income_Energy_Efficiency_Program.pdf>.

US Department of Energy (USDoE) 2003, *Non energy benefits of weatherization*, Energy Efficiency and Renewable Energy, USDoE, viewed 28 March 2008, <www.eere.energy.gov/weatherization/ne_benefits.html>.

—— 2006, *Weatherization allocation formula*, Energy Efficiency and Renewable Energy, USDoE, viewed 28 March 2008, <http://www.eere.energy.gov/weatherization/allocation_formula.html>.

—— 2007, *Weatherization program*, Energy Efficiency and Renewable Energy, USDoE, viewed 28 March 2008, <http://www.eere.energy.gov/weatherization/>.

—— 2008a, *Sources of funding for the weatherization assistance program*, Energy Efficiency and Renewable Energy, USDoE, viewed 28 March 2008, <www.eere.energy.gov/weatherization/prog_goals.html>.

—— 2008b, *Weatherization program goals*, Energy Efficiency and Renewable Energy, USDoE, viewed 28 March 2008, <http://www.eere.energy.gov/weatherization/prog_goals.html>.

US Office of Management and Budget (USOMB) 2007, *Detailed information on the Weatherization Assistance Assessment*, Expectmore.gov website, USOMB, viewed 28 March 2008, <http://www.crispexi.net/omb/expectmore/detail/10000128.2003.html>.

Wilkenfeld, G & Associates 2004, *NFEE – Energy efficiency improvement potential case studies, residential water heating*, report to the Sustainable Energy Authority Victoria by George Wilkenfeld & Associates, viewed 3 December 2007, < http://www.nfee.gov.au/public/download.jsp?id=191>.

Yates, M & Milligan, V 2007, *Housing affordability: a 21st century problem*, AHURI Final Report No. 105, viewed 3 December 2007, <http://www.ahuri.edu.au/publications/download/nrv3_final_report>.

York, D & Kushler, M 2005, *Meeting essential needs: the results of a national search for exemplary utility-funded low-income energy efficiency program*, Report U053, American Council for an Energy-Efficient Economy, viewed 3 December 2007, < http://www.aceee.org/getfile.cfm?publicationid=5>.

The impact of carbon prices on Victorian and Australian households

A report for the
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While the National Institute endeavours to provide reliable forecasts and believes the material is accurate it will not be liable for any claim by any party acting on such information.

Contents

1. Introduction

The objective of this paper is to assess the consequences of the adoption of a universal carbon pricing scheme as a core instrument in combating global warming. By universal is meant a common carbon price imposed on Victoria, the rest of Australia and the rest of the world. By carbon price is meant either a tax levied on the CO_2 content of any product, e.g. $25 a tonne of carbon, or a cost of carbon that is imposed from the market clearing price of an emission's trading system.

In terms of direct macroeconomic costs, it does not matter whether the carbon price is determined from a tax determined by Governments, or by a market price with Government determining the CO_2 quotas that will drive the carbon price outcomes.

In terms of the effective distribution of the costs of carbon pricing throughout the economy, the mechanism selected for determining the carbon price is important. Under an emissions trading system, efficient energy producers benefit because they can sell CO_2 permits to less efficient producers. However, if Governments gave the initial CO_2 permits away, as is the case with the current European Emissions Trading Scheme, in perpetuity (with a global discount factor applied over time to reduce the stock of permits on issue to reach global CO_2 targets), then there would not be much net additional resources available to Governments to compensate those groups that were disproportionately/inequitably affected by the price of carbon.

If, on the other hand, a tax is the mechanism for pricing carbon, then Governments collect the revenue and will have far greater capacity to compensate those inequitably impacted by the scheme. The disadvantage of this is that Governments will have to make all the decisions in terms of the trade of economic efficiency (helping businesses to adjust to a lower carbon intensive world) and economic equity (helping households adjust to a lower carbon intensive world).

Clearly a compromise is required with the resources more evenly distributed between businesses and Governments with market decisions driving the businesses' efficiency agenda. One way of doing this is to price the initial issuing of permits at near the price that would result from the initial marginal carbon trades. Governments would collect this revenue. This has the drawback of imposing an initial up-front carbon cost on all businesses, which would be maintained by limiting the duration of a permit to a year.

Under a market mechanism, that is, CO_2 emissions trading scheme, solution the willingness of Governments to price the initial issuing of permits, or alternatively who are issued the permits (such as lower income households) will depend, in part, on the estimates of the resources required for social equity. The current design of the Australian State Government Emissions Trading System reflects a consideration of the issues.

The objective of this paper is not to design an optimal Emissions Trading System, but to provide part of the information that will influence its design.

This will be done by:

(i) estimating the carbon content of different categories of expenditure that constitute household budgets;

(ii) estimating the expenditure patterns of different household types; and

(iii) combining (i) and (ii) to obtain estimates of the carbon consumption of different household types and, therefore, the impact of carbon taxes on different household types.

NIEIR's household database consists of 43 household types. The household types are overlapping. Hence, for this study 20 of the 43 household types have been selected to give a representative range of households across the spectrum. The overall average household is also included.

2. Estimating the carbon content of expenditures in the Victorian economy – 2001

This study takes off from the study NIEIR did for the Victorian Department of Sustainability and Environment, titled "*The total CO_2 emission content of Victorian industries – 2001*". This study used an input-output framework to develop estimates of the carbon content of industry output and expenditures for the Victorian economy. The methodology for doing this is reproduced in Appendix A.

The objective of the analysis was to estimate the direct and indirect carbon content of goods and services produced or sold into Victorian markets. Any good or service will have a direct carbon content from the petroleum, gas, electricity, etc. used in producing the good or service. However, any good or service will use other goods and services in its production. These other goods and services will have a carbon content of production that will be added to the direct carbon content of the good or service. Thus, the total carbon content of a good or service will be greater than the direct carbon content. This means that a carbon price will have a cascading impact through the industrial structure having the well known multiplier impact on final prices.

This study used the methodology of the Department of Sustainability and Environment study to estimate the direct and indirect carbon content of private consumption in Victoria. The resulting estimates are shown in Table 1. The industry classifications in the table are the industries of the input-output framework analysis that are based on the National Australian Bureau of Statistics Input-Output Table.

The bottom line is that in 2001 in Victoria 62 million tonnes of carbon were consumed by Victorian households via household consumption expenditures. Of this total 40 million tonnes were sourced from Victorian produced goods and services and 22 million tonnes from interstate and foreign sourced production.

Almost half, or 28 million tonnes, of carbon comes from the direct use of petroleum products, gas or electricity. The remaining 32 million tonnes come from the petroleum products, gas, electricity, coal, etc. embodied in the complete range of goods and services sold into the Victorian consumer household market. In 2001, the average carbon consumption of Victorian households from private consumption was 36.5 tonnes per annum if the CO_2 content of total consumption expenditure is divided by the number of occupied dwellings.

One issue of interest is, how much of this carbon comes from Victorian sources of carbon. This will not be the 39.8 million tonnes since Victorian produced goods and services will include interstate and foreign sources of carbon. The average rule is that excluding the direct use of petroleum, gas and electricity, approximately two thirds of the carbon in Victorian produced goods comes from Victorian sourced carbon. This would mean that the 39.8 million tonnes is reduced to 34 million tonnes in terms of Victorian sourced carbon. Thus, 55 per cent of the total carbon content of Victorian household consumption expenditure is sourced from Victorian based energy production.

In order to estimate the interstate carbon content of expenditures it was necessary to duplicate the Victorian analysis at the national level. The national analysis results were used below to estimate the CO_2 content of expenditures for all Australian households.

Table 1	Carbon content of Victorian private consumption expenditure ('000 tonnes) – 2001			
	Victorian sources of carbon	Interstate and foreign sources of carbon	Total carbon content	CO_2 content in tonnes per $ of consumption expenditure
Sheep	1.1	0.4	1.5	0.00029
Grains	0.0	0.0	0.0	0.00000
Beef cattle	2.4	0.0	2.4	0.00020
Dairy cattle	0.2	0.1	0.3	0.00051
Pigs	0.3	0.2	0.5	0.00038
Poultry	19.3	10.3	29.6	0.00034
Other agriculture	205.5	156.9	362.3	0.00032
Services to agriculture; hunting and trapping	2.2	0.0	2.2	0.00024
Forestry and logging	1.2	0.7	1.9	0.00029
Commercial fishing	49.7	130.2	180.0	0.00058
Coal; oil and gas	0.0	2358.7	2358.7	0.01386
Iron ores	0.0	0.0	0.0	0.00000
Non-ferrous metal ores	0.0	0.0	0.0	0.00000
Other mining	0.4	0.0	0.4	0.00128
Services to mining	0.0	0.0	0.0	0.00000
Meat and meat products	337.5	134.6	472.1	0.00051
Dairy products	471.7	22.8	494.5	0.00064
Fruit and vegetable products	346.9	133.2	480.0	0.00052
Oils and fats	119.9	25.3	145.2	0.00043
Flour mill products and cereal foods	36.8	156.7	193.6	0.00050
Bakery products	150.0	121.2	271.2	0.00038
Confectionery	55.4	35.3	90.7	0.00033
Other food products	140.1	278.3	418.4	0.00044
Soft drinks, cordials and syrups	189.0	222.7	411.8	0.00064
Beer and malt	175.1	23.2	198.3	0.00031
Wine and spirits	3.0	72.8	75.8	0.00024
Tobacco products	111.5	28.0	139.4	0.00031
Textile fibres, yarns and woven fabrics	48.0	26.8	74.8	0.00062
Textile products	141.9	120.5	262.4	0.00069
Knitting mill products	0.2	225.9	226.1	0.00149
Clothing	127.0	566.7	693.8	0.00071
Footwear	1.9	104.4	106.2	0.00041
Leather and leather products	1.1	2.4	3.5	0.00043
Sawmill products	0.2	0.0	0.2	0.00064
Other wood products	0.0	69.5	69.5	0.00078
Pulp, paper and paperboard	43.1	65.4	108.5	0.00218
Paper containers and products	92.5	121.2	213.8	0.00105
Printing and services to printing	118.3	69.9	188.2	0.00085
Publishing; recorded media etc	122.4	111.5	233.9	0.00042
Petroleum and coal products	1482.4	5929.5	7411.8	0.00487
Basic chemicals	34.5	656.0	690.5	0.00223

Table 1 Carbon content of Victorian private consumption expenditure ('000 tonnes) – 2001 (continued)				
	Victorian sources of carbon	Interstate and foreign sources of carbon	Total carbon content	CO_2 content in tonnes per $ of consumption expenditure
Paints	0.5	0.0	0.5	0.00093
Medicinal and pharmaceutical products, pesticides	14.7	226.5	241.2	0.00033
Soap and detergents	29.5	129.0	158.4	0.00071
Cosmetics and toiletry preparations	26.9	275.8	302.7	0.00085
Other chemical products	15.6	3.7	19.3	0.00067
Rubber products	6.0	29.4	35.4	0.00050
Plastic products	75.7	118.8	194.5	0.00095
Glass and glass products	3.6	7.4	11.0	0.00081
Ceramic products	0.0	83.8	83.8	0.00221
Cement, lime and concrete slurry	0.0	0.0	0.0	0.00000
Plaster and other concrete products	0.0	0.0	0.0	0.00000
Other non-metallic mineral products	0.0	0.0	0.0	0.00000
Iron and steel	0.0	0.0	0.0	0.00000
Basic non-ferrous metal and products	11.3	13.9	25.2	0.00347
Structural metal products	0.0	0.0	0.0	0.00000
Sheet metal products	13.3	11.6	24.9	0.00148
Fabricated metal products	0.0	133.2	133.2	0.00088
Motor vehicles and parts; other transport equipment	628.4	949.6	1578.0	0.00036
Ships and boats	0.0	96.5	96.5	0.00062
Railway equipment	0.0	0.0	0.0	0.00000
Aircraft	0.0	15.6	15.6	0.00087
Photographic and scientific equipment	22.3	138.0	160.3	0.00029
Electronic equipment	86.2	471.6	557.8	0.00076
Household appliances	42.9	556.1	599.0	0.00083
Other electrical equipment	1.9	92.9	94.9	0.00111
Agricultural, mining etc. machinery	27.9	27.8	55.7	0.00084
Other machinery and equipment	0.5	3.6	4.0	0.00058
Prefabricated buildings	0.0	0.0	0.0	0.00000
Furniture	99.3	277.6	376.9	0.00046
Other manufacturing	75.2	153.4	228.6	0.00041
Electricity supply	15933.0	0.0	15933.0	0.00869
Gas supply	4244.0	0.0	4244.0	0.02205
Water supply; sewerage and drainage services	492.5	7.5	500.0	0.00044
Residential building	0.0	0.0	0.0	0.00000
Other construction	0.0	0.0	0.0	0.00000
Wholesale trade	698.7	202.2	900.9	0.00030
Retail trade	5015.8	181.0	5196.8	0.00041
Mechanical repairs	296.7	78.7	375.4	0.00019
Other repairs	3.5	133.6	137.1	0.00046

Table 1 Carbon content of Victorian private consumption expenditure ('000 tonnes) – 2001 (continued)				
	Victorian sources of carbon	Interstate and foreign sources of carbon	Total carbon content	CO_2 content in tonnes per $ of consumption expenditure
Accommodation, cafes and restaurants	1225.6	904.0	2129.6	0.00036
Road transport	0.0	3092.7	3092.7	0.00238
Rail, pipeline and other transport	0.0	258.8	258.8	0.00089
Water transport	1057.2	0.0	1057.2	0.00438
Air and space transport	703.7	964.1	1667.8	0.00095
Services to transport; storage	22.7	9.2	31.9	0.00015
Communication services	484.5	9.8	494.3	0.00023
Banking	111.2	1.2	112.4	0.00004
Non-bank finance	39.7	0.1	39.7	0.00006
Insurance	100.1	0.0	100.1	0.00003
Services to finance, investment and insurance	21.1	10.7	31.8	0.00005
Ownership of dwellings	797.5	3.7	801.2	0.00005
Other property services	15.5	11.4	27.0	0.00009
Scientific research, technical and computer services	1.3	0.0	1.3	0.00018
Legal, accounting, marketing and business management services	135.0	2.1	137.1	0.00015
Other business services	45.0	11.0	56.0	0.00019
Government administration	85.1	14.5	99.5	0.00041
Defence	0.0	0.0	0.0	0.00000
Education	457.8	49.0	506.8	0.00019
Health services	393.6	46.8	440.3	0.00012
Community services	212.4	0.5	212.9	0.00031
Motion picture, radio and television services	5.9	0.1	6.0	0.00009
Libraries, museums and the arts	11.2	0.2	11.5	0.00013
Sport, gambling and recreational services	627.6	178.8	806.4	0.00026
Personal services	441.1	20.0	461.1	0.00030
Other services	380.2	112.5	492.7	0.00019
Total	**39873.7**	**22100.9**	**61974.6**	**0.00064**

3. The selection of household types

The construction of household types is obtained by manipulating the Australian Bureau of Statistics' Household expenditure Survey (HES) database. The selection is done by stating the criteria for each household type and then finding the number of households in the HES database that satisfy the criteria.

For any given unit record (i.e. household) in the database the expenditures across over 600 expenditure categories are given. For the selected household type the expenditures are averaged across the selected number of households and the average expenditure by category for the household type are then aggregated into the 106 industries of the Australian Bureau of Statistics' Input-Output Tables.

Given the household characteristics and the 1 per cent sample data provided from the Census, the number of households in each household type is then estimated at the State and regional level.

For this study twenty household types are selected, along with the overall average household type.

The criteria used to select each household type are as follows.

Household type 1: Working age security dependent family type one

The characteristics of social security dependent family type 1 are set out below.

The principle source of household income is derived from the following:

(i) disability support pension;

(ii) unemployment benefits;

(iii) education and sickness benefits;

(iv) other government pensions and benefits;

(v) zero weekly income from work;

(vi) some other private income;

(vii) the household has dependent children;

(viii) not a retired household (that is age of household head is not greater than 55); and

(ix) no household member works.

Household type 2: Working age social security dependent family type two

The characteristic of the household type is one where total weekly income from government benefits as a percentage of working household employee income exceeds 30 per cent. Also:

(i) the household has dependent children;

(ii) the household is not a retired household (that is, the age of the household head is not greater than 55); and

(iii) no household member receives a Veteran Affairs pension, Age pension or Overseas pension or benefit.

Household type 3: 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.

As will be seen below, 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.

Household type 4: Non-working income dependent working age families

This household type is one where unearned income (including government benefits), as a per cent of total gross household income, exceeds 30 per cent. Also:

(i) the household has dependent children;

(ii) the household is not a retired household; and

(iii) no other family members work.

Household type 5: Age pension household

This household type receives:

(i) Veteran Affairs pension;

(ii) Age pension; or

(iii) Overseas pension.

Household type 6: Employed families

These are households with dependent children where the principle source of income is from work.

Household type 7: Other non-retired households

Households without dependent children (single or couples) either in employment or not in employment.

Household type 8: Home owners

Households who own their own homes. That is, do not pay rent or have a mortgage.

Household type 9: Home renters

Households who pay rent.

Household type 10: Mortgage households

Households who are paying off a mortgage.

Household type 11: Low income working age households

Households with incomes of less than $60,000, in 2000 prices, where the household head is of working age.

Household type 12: DINKS

Couple households without children where both are working.

Household type 13: Wage and salary households

Households where the principle source of income is from wages and salaries.

Household type 14: Self-employed households

Households where one or more members are self-employed.

Household type 15: Low skilled households

Households with no post school qualifications.

Household type 16: Intermediate skilled households

Household with TAFE or equivalent qualifications.

Household type 17: Trade occupation households

Household head in a trade occupation (that is, a higher TAFE qualification).

Household type 18: High skilled households

Households with a tertiary education qualification.

Household type 19: Management/Professional households

Household with household head in a management or professional occupation.

Household type 20: High income tertiary educated households

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

Household type 21: All household average

Average of all households.

It can be seen from the above criteria that the household types will be overlapping. Clearly poor households are a segment of social security dependent households Type 1. Also, home owning households will include retired, employed and social security dependent households. The same is true for households that rent.

3.1 Household expenditure by industry

For 2001 the translation of expenditures by household types by input-output industries required finding the adjustment factor by industry for total expenditures from the HES data by input-output indicators, as compared to the total expenditures from the Victorian input-output tables by industry.

In the main the adjustment factor was less than 1 because the input-output table expenditures exclude indirect taxes, transport costs and distribution costs. These costs, however, have been put back into the analysis as the direct contribution of the rental, wholesale and transport sectors to Victorian consumption.

Table 2 shows the results for the 20 Victorian households in terms of their average expenditure in broad industry classes. These industry classes are derived by aggregating the 106 industry classes in the input-output tables.

Table 2 Average weekly expenditure by household types (excluding actual and imputed rent) by broad industry groups – $2006

	Agri-culture	Mining	Manufact-uring	Electricity , gas and water	Building and con-struction	Wholesale, retail and repairs	Transport	Commun-ication	Finance	Business services	Community services	Recreation and personnel services	Total
Working age social security dependant family type one	14.3	0.9	212.5	35.5	0.0	112.6	21.4	26.6	39.0	5.6	43.8	39.6	551.7
Working age social security dependant family type two	16.8	1.1	244.8	39.1	0.0	160.7	23.6	29.8	47.8	11.5	55.5	59.5	690.3
Poor family households	11.5	0.9	189.7	34.6	0.0	105.8	18.2	24.2	36.0	5.3	47.5	33.1	506.9
Non working income dependant families of working age	18.8	1.3	284.2	42.3	0.0	196.4	34.9	31.2	60.3	16.8	76.8	72.0	834.9
Age pension households	19.7	1.1	222.8	37.6	0.0	174.5	46.5	22.0	59.9	16.1	79.0	87.5	766.8
Employed families	27.0	2.0	417.8	57.2	0.0	329.3	55.3	37.3	106.3	20.5	133.4	141.4	1327.5
Other non retired households	17.2	1.4	300.5	40.0	0.0	251.3	59.0	30.8	80.4	19.5	70.5	92.5	963.1
Home owning households	24.7	1.4	306.8	48.5	0.0	248.3	57.1	26.5	87.9	24.0	70.5	115.4	1011.1
Home renter households	13.2	1.1	215.0	23.7	0.0	161.7	38.1	28.7	45.1	12.8	53.9	47.0	640.2
Households with mortgages	22.4	1.8	375.9	55.5	0.0	308.2	59.2	35.0	96.0	22.2	96.2	130.9	1203.4
Low income working age households	17.4	1.2	270.2	40.2	0.0	193.3	36.8	30.6	64.7	14.9	66.3	77.7	813.3
DINK households	16.8	1.8	341.6	41.0	0.0	297.2	59.4	31.2	97.6	22.1	65.4	104.2	1078.4
Wage and salary households	22.6	1.8	369.1	48.8	0.0	299.4	59.6	34.1	97.0	20.4	99.2	123.1	1175.2
Self employed households	27.6	2.1	418.4	60.8	0.0	398.9	82.4	39.3	119.7	18.2	125.6	156.9	1449.7
Low skilled households	18.0	1.2	251.1	40.5	0.0	190.3	39.0	26.5	64.1	14.1	51.4	81.5	777.6
Intermediate skilled households	22.7	1.5	337.4	47.0	0.0	254.8	48.5	31.1	88.6	25.3	73.9	103.7	1034.6
Trade occupation households	22.3	1.8	401.9	52.8	0.0	271.9	47.1	34.1	101.1	22.7	98.8	105.8	1160.3
High skilled households	25.1	1.8	358.0	47.3	0.0	329.4	84.8	33.2	96.2	27.3	115.8	140.3	1259.2
Management-professional households	26.8	2.2	422.1	55.4	0.0	427.8	95.1	37.9	124.8	33.8	153.2	166.7	1545.7
High income tertiary educated households	35.1	2.7	504.5	59.5	0.0	526.4	154.7	40.0	146.9	56.1	184.6	214.9	1925.4
All households	**21.1**	**1.4**	**302.8**	**44.1**	**0.0**	**245.6**	**52.8**	**29.5**	**79.9**	**20.6**	**101.3**	**102.1**	**1001.2**

4. Victorian and Australian households: expenditure characteristics and CO_2 content

Table 3 gives the average weekly expenditures for the 20 household types. The average expenditure for all households in 2006 prices is $1,000 a week, excluding actual and imported rent. The polar household type, in terms of low expenditures is, not unexpectedly, the poor households. Average weekly expenditure is $559. At the other polar extreme, again not unexpectedly, are the high income tertiary educated households, with an average weekly expenditure of $1,925. There is balance here in relation to the polar households. The poor household type represents expenditures of one half the average expenditures, while the high income tertiary educated households represent approximately double the average household.

From Table 3, two household types that are representative of households approximately half way between poor households and average households are:

- Age pension households; and
- low skilled working households.

Two household types that occupy a position approximately half way between the average household and the top expenditure household type are:

- self-employed households; and
- management/professional households.

The estimated number of each household type in Victoria in 2001 is given in the last column of Table 3. These percentages clearly bring out the overlapping nature of the households. It should be noted, for example, that low income working age households would include both employed and those not in workforce, low income working age households. That is, include Types 1 and 2 working age social security dependent families, as well as a good proportion of low skilled working households.

Table 4 gives the corresponding results for Australia. In general, the Australian average expenditures are below the Victorian level.

4.1 Household types – equivalent expenditures

Different household types have different household memberships. Therefore, it is necessary to standardise expenditures on a per capita basis. One way to do this would be to simply divide by the average number of adults and children in each household type. However, different family members have different expenditure needs. To obtain a good expenditure estimate, which allows comparison between the different household types, it is desirable to produce an equivalence expenditure estimate where each household member is weighted differently for expenditure requirements.

In order to obtain an equivalence expenditure estimate between household types, the following scale is applied:

- the first adult is counted as 1.0;
- all subsequent adults (that is, persons over 17 years of age in the household) are given a weight of 0.73; and
- each child (person under the age of 18 years) is given a weight of 0.4.

The scale captures the economies of scale in household size.

Using this scale the equivalence household numbers are derived in Tables 3 and 4 under equivalence household expenditures per capita. In terms of the polar extremes, there is little change. The poor Victorian household per capita equivalence expenditure represents 27.6 per cent of the corresponding expenditures of high income tertiary educated households, compared to the 26.3 per cent for the unadjusted total weekly expenditure outcome.

However, Age pension households now move much closer to the average per capita equivalence expenditures for all households (which in Victoria is $478 in 2006 prices). However, other household types decline compared to the average. For example, for working age social security dependent families (Type 2) the unadjusted expenditure, as a per cent of the Victorian average, was 69 per cent. For the per capita adjusted equivalent household expenditure the result is 54 per cent, which represents a significant decline.

4.2 Household types – the CO_2 content of expenditures

The CO_2 content of household expenditures is simply obtained by multiplying the average CO_2 content per $ of expenditure, divided from the input-output analysis at either the Victorian or national level for a given industry, by the corresponding same industry expenditure of each household type on an annual basis, and then summing the result for each household type across all 106 input-output industries. The results are given in Table 3 for Victoria and Table 4 for Australia.

Clearly, from Tables 3 and 4, the higher the weekly expenditure, the higher the CO_2 content. However, as Figure 1(a) for Victoria and Figure 1(b) for Australia shows, the CO_2 content per dollar of expenditure declines as expenditure increases. That is, CO_2 consumption is inelastic with respect to the change in total expenditure, so that the proportion of CO_2 embodied in total expenditure declines as total expenditure increases.

Comparing the CO_2 results in Tables 3 and 4 indicates that Victoria has a higher CO_2 consumption per household and a higher CO_2 content of total expenditures. The reasons for this outcome are:

- the higher average household expenditures in Victoria;
- the higher CO_2 content of energy production in Victoria from the use of brown coal in electricity generation; and
- the higher household direct energy consumption, no doubt in part due to lower minimum temperatures compared to Australia as a whole.

Table 3 Victorian household types – expenditure (excluding rent) and carbon consumption – 2001

	Total weekly expenditure (2006 prices)	Average number of adults	Average number of children	Equivalence household numbers	Household average weekly equivalence expenditure per capita		Carbon consumption per $ of annual expenditure (tonnes)	Share of total households (per cent)
					2006 prices	Total annual carbon consumption		
Working age social security dependant family type one	551.7	2.0	1.9	2.5	220	28.0	0.00097	8.1
Working age social security dependant family type two	690.3	2.2	1.9	2.7	260	31.4	0.00087	10.7
Poor family households	506.9	1.7	2.0	2.3	218	26.8	0.00102	6.1
Non working income dependant families of working age	834.9	2.3	1.9	2.7	308	34.7	0.00080	12.4
Age pension households	766.8	2.0	0.1	1.8	433	28.8	0.00072	25.1
Employed families	1327.5	2.6	1.8	2.9	458	46.9	0.00068	25.2
Other non retired households	963.1	1.9	0.0	1.7	573	36.0	0.00072	29.9
Home owning households	1011.1	2.2	0.4	2.1	492	36.6	0.00070	45.9
Home renter households	640.2	1.7	0.7	1.8	357	28.0	0.00084	25.8
Households with mortgages	1203.4	2.3	1.1	2.4	494	43.1	0.00069	28.3
Low income working age households	813.3	2.0	1.0	2.2	377	33.0	0.00078	43.9
DINK households	1078.4	2.0	0.0	1.7	625	37.3	0.00067	4.5
Wage and salary households	1175.2	2.3	0.9	2.3	508	42.2	0.00069	40.1
Self employed households	1449.7	2.5	0.9	2.4	598	48.9	0.00065	4.2
Low skilled households	777.6	2.1	0.6	2.0	384	31.1	0.00077	46.0
Intermediate skilled households	1034.6	2.2	0.7	2.2	472	38.4	0.00071	30.3
Trade occupation households	1160.3	2.4	1.1	2.4	474	42.6	0.00071	11.5
High skilled households	1259.2	2.1	0.7	2.1	599	43.3	0.00066	23.7
Management-professional households	1545.7	2.4	0.9	2.4	651	51.1	0.00064	11.9
High income tertiary educated households	1925.4	2.6	0.7	2.4	790	61.2	0.00061	7.7
All households	**1001.2**	**2.1**	**0.7**	**2.1**	**478**	**36.5**	**0.00070**	**100.0**

Table 4 Australian household types – expenditure (excluding rent) and carbon consumption – 2001

	Total weekly expenditure (2006 prices)	Average number of adults	Average number of children	Equivalence household numbers	Household average weekly equivalence expenditure per capita		Carbon consumption per $ of annual expenditure (tonnes)	Share of total households (per cent)
					2006 prices	Total annual carbon consumption		
Working age social security dependant family type one	510.6	1.9	2.0	2.5	206	23.4	0.00088	8.7
Working age social security dependant family type two	639.3	2.1	2.0	2.6	245	26.3	0.00079	11.3
Poor family households	468.0	1.7	2.1	2.3	201	22.3	0.00092	6.6
Non working income dependant families of working age	776.1	2.2	1.9	2.7	290	29.4	0.00073	13.0
Age pension households	719.6	1.9	0.0	1.7	414	24.9	0.00067	24.9
Employed families	1287.0	2.6	1.8	2.9	447	42.1	0.00063	24.5
Other non retired households	923.2	1.9	0.0	1.7	551	32.1	0.00067	30.5
Home owning households	961.4	2.2	0.4	2.0	476	32.7	0.00065	43.1
Home renter households	594.6	1.7	0.7	1.8	326	24.9	0.00081	30.0
Households with mortgages	1140.1	2.3	1.1	2.4	471	38.7	0.00065	26.9
Low income working age households	771.5	2.0	1.0	2.1	362	28.6	0.00071	44.5
DINK households	1058.3	2.0	0.0	1.7	614	33.5	0.00061	4.8
Wage and salary households	1145.2	2.3	0.9	2.3	501	38.0	0.00064	40.1
Self employed households	1392.9	2.4	0.9	2.4	578	43.9	0.00061	4.1
Low skilled households	738.8	2.0	0.6	2.0	369	26.9	0.00070	46.0
Intermediate skilled households	983.5	2.2	0.7	2.2	457	33.6	0.00066	31.7
Trade occupation households	1123.1	2.3	1.1	2.4	467	37.9	0.00065	11.9
High skilled households	1232.8	2.1	0.7	2.1	590	40.0	0.00062	22.2
Management-professional households	1549.3	2.4	0.9	2.4	656	47.8	0.00059	11.3
High income tertiary educated households	1905.5	2.5	0.7	2.4	788	57.8	0.00058	7.4
All households	**953.4**	**2.1**	**0.7**	**2.1**	**461**	**32.2**	**0.00065**	**100.0**

Figure 1(a): Victorian households carbon content (in tonnes) per dollar of expenditure versus weekly expenditure

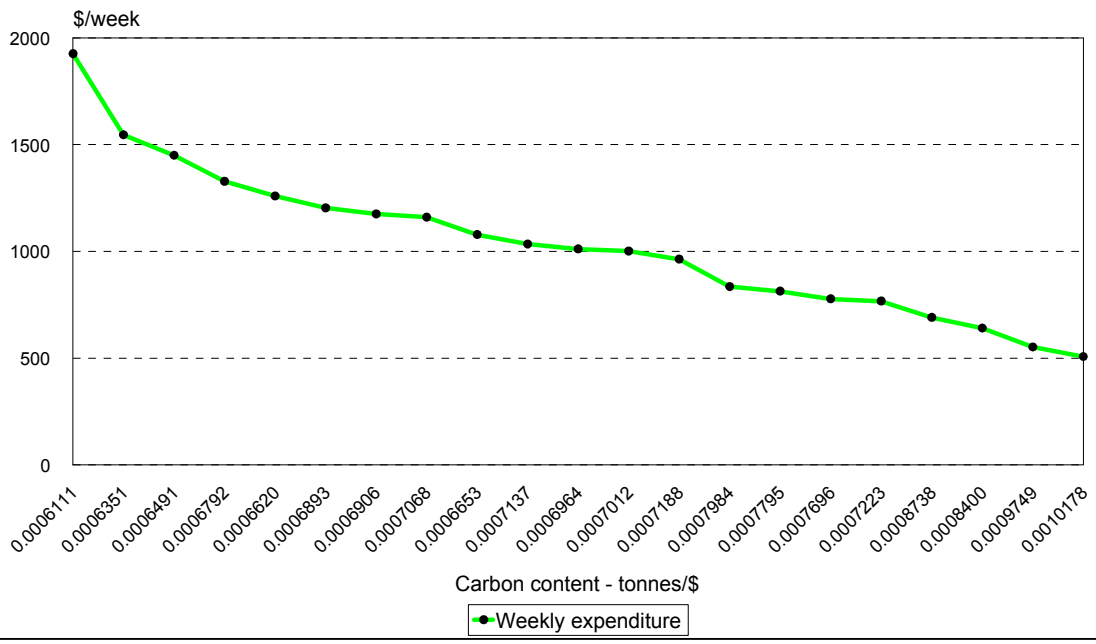
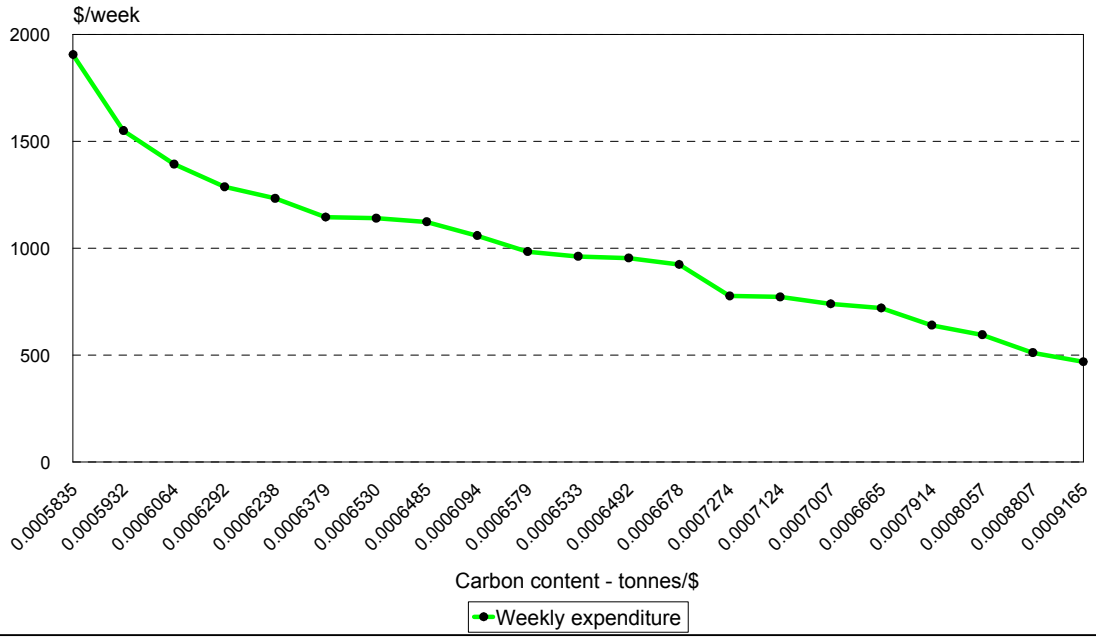


Figure 1(b): Australian households carbon content (in tonnes) per dollar of expenditure versus weekly expenditure



5. Victorian and Australian households – the impact of a $25 and $50 carbon price

The impact of a $25 and $50 a tonne carbon price on the 10 household types is shown in Table 5 for Victoria and Table 6 for Australia. The additional carbon cost as a per cent of expenditure is regressive, either in terms of total expenditure or equivalised expenditures (as indicated by Figures 2 and 3).

Focussing on Victoria, a $25 per tonne carbon price would represent, from Table 5, 2.5 per cent of expenditures for the poor household type, while for the high income tertiary educated households it would represent 1.5 per cent. The all household average for Victoria is 1.8 per cent and 3.5 per cent for $50 a tonne.

However, it is necessary to dig deeper. Poor households clearly had less room for adjustment to the imposition of carbon costs. The United Kingdom HM Treasury's "*The Green Book: Appraisal and Evaluation in Central Government"*, guidelines require that each monetary cost and benefit should be weighted according to the relative prosperity of those receiving the benefit or bearing the cost. The formula they recommend for doing this is:

$$U = log\, C$$

Where:

C = household consumption; and

U = household utility good from consumption.

This implies a marginal utility of consumption of 1/C. Hence, the utility scale derived in Table 5 is relative to the poorest household. It implies the utility cost of the high income tertiary educated households of an extra dollar of carbon cost is only a little over one quarter of the dollar cost imposed on poor households. The utility for the average household is 46 per cent per dollar of expenditure loss or gain of the poorest household.

This differential is reflected in the utility adjusted carbon costs as a per cent of expenditure estimates given in the last two columns of Table 5 for Victoria and Table 6 for Australia. The regressive nature of the tax is shown in Figure 4(a) for Victoria and Figure 4(b) for Australia. For Victoria, on a utility adjusted carbon cost, the poor household average carbon cost of 2.5 per cent for the $25 case stays the same. However, for the high income tertiary educated households the rate declines to 0.4, or 16 per cent of the poorest household. The all household average on a utility adjusted basis goes from 1.8 per cent to 0.8 per cent, or a decline of 56 per cent.

Table 5 Victorian household types – Impact of carbon price

	Utility scale	Carbon cost – $2006		Carbon cost – % of annual expenditure			Utility adjusted carbon costs – $2006		Utility adjusted carbon costs – % of annual expenditure	
		$25	$50	$25	$50		$25	$50	$25	$50
Working age social security dependant family type one	0.99	699.2	1398.5	2.4	4.9	220	692.9	1385.8	2.4	4.8
Working age social security dependant family type two	0.84	784.2	1568.3	2.2	4.4	260	655.4	1310.7	1.8	3.7
Poor family households	1.00	670.7	1341.5	2.5	5.1	218	670.7	1341.5	2.5	5.1
Non working income dependant families of working age	0.71	866.6	1733.1	2.0	4.0	308	612.6	1225.2	1.4	2.8
Age pension households	0.50	720.0	1440.0	1.8	3.6	433	361.9	723.7	0.9	1.8
Employed families	0.48	1172.2	2344.4	1.7	3.4	458	557.4	1114.9	0.8	1.6
Other non retired households	0.38	900.1	1800.2	1.8	3.6	573	342.1	684.1	0.7	1.4
Home owning households	0.44	915.5	1830.9	1.7	3.5	492	405.1	810.1	0.8	1.5
Home renter households	0.61	699.1	1398.3	2.1	4.2	357	425.7	851.5	1.3	2.6
Households with mortgages	0.44	1078.4	2156.8	1.7	3.4	494	474.8	949.6	0.8	1.5
Low income working age households	0.58	824.2	1648.4	1.9	3.9	377	475.6	951.2	1.1	2.2
DINK households	0.35	932.7	1865.4	1.7	3.3	625	324.6	649.2	0.6	1.2
Wage and salary households	0.43	1055.1	2110.2	1.7	3.5	508	452.5	905.0	0.7	1.5
Self employed households	0.36	1223.4	2446.7	1.6	3.2	598	445.5	891.0	0.6	1.2
Low skilled households	0.57	778.0	1556.0	1.9	3.8	384	441.2	882.4	1.1	2.2
Intermediate skilled households	0.46	960.0	1920.1	1.8	3.6	472	442.5	885.0	0.8	1.6
Trade occupation households	0.46	1066.1	2132.2	1.8	3.5	474	489.1	978.3	0.8	1.6
High skilled households	0.36	1083.7	2167.5	1.7	3.3	599	394.0	788.0	0.6	1.2
Management-professional households	0.33	1276.3	2552.7	1.6	3.2	651	426.7	853.5	0.5	1.1
High income tertiary educated households	0.28	1529.7	3059.4	1.5	3.1	790	421.6	843.1	0.4	0.8
All households	**0.46**	**912.7**	**1825.5**	**1.8**	**3.5**	**478**	**415.5**	**831.1**	**0.8**	**1.6**

Table 6 Australian household types – Impact of carbon price

	Utility scale	Carbon cost – $2006		Carbon cost – % of annual expenditure			Utility adjusted carbon costs – $2006		Utility adjusted carbon costs – % of annual expenditure	
		$25	$50	$25	$50		$25	$50	$25	$50
Working age social security dependant family type one	0.98	584.7	1169.4	2.2	4.4	206	571.7	1143.3	2.2	4.3
Working age social security dependant family type two	0.82	657.7	1315.5	2.0	4.0	245	540.3	1080.7	1.6	3.3
Poor family households	1.00	557.7	1115.4	2.3	4.6	201	557.7	1115.4	2.3	4.6
Non working income dependant families of working age	0.69	734.0	1467.9	1.8	3.6	290	507.9	1015.8	1.3	2.5
Age pension households	0.49	623.5	1247.0	1.7	3.3	414	303.0	606.0	0.8	1.6
Employed families	0.45	1052.8	2105.7	1.6	3.1	447	473.6	947.2	0.7	1.4
Other non retired households	0.36	801.5	1603.1	1.7	3.3	551	292.4	584.8	0.6	1.2
Home owning households	0.42	816.6	1633.2	1.6	3.3	476	345.1	690.1	0.7	1.4
Home renter households	0.62	622.8	1245.6	2.0	4.0	326	384.4	768.8	1.2	2.5
Households with mortgages	0.43	967.9	1935.9	1.6	3.3	471	413.2	826.4	0.7	1.4
Low income working age households	0.56	714.6	1429.1	1.8	3.6	362	397.1	794.2	1.0	2.0
DINK households	0.33	838.4	1676.9	1.5	3.0	614	274.6	549.2	0.5	1.0
Wage and salary households	0.40	949.8	1899.5	1.6	3.2	501	381.0	762.0	0.6	1.3
Self employed households	0.35	1098.1	2196.2	1.5	3.0	578	382.2	764.4	0.5	1.1
Low skilled households	0.55	673.0	1346.1	1.8	3.5	369	366.8	733.6	1.0	1.9
Intermediate skilled households	0.44	841.2	1682.5	1.6	3.3	457	370.0	740.1	0.7	1.4
Trade occupation households	0.43	946.9	1893.8	1.6	3.2	467	408.0	815.9	0.7	1.4
High skilled households	0.34	999.8	1999.5	1.6	3.1	590	340.7	681.3	0.5	1.1
Management-professional households	0.31	1194.8	2389.5	1.5	3.0	656	365.9	731.8	0.5	0.9
High income tertiary educated households	0.26	1445.5	2890.9	1.5	2.9	788	368.7	737.4	0.4	0.7
All households	0.44	804.7	1609.3	1.6	3.2	461	351.1	702.3	0.7	1.4

Figure 2(a): Victorian households - carbon cost at $25 as per cent of income versus weekly expenditure

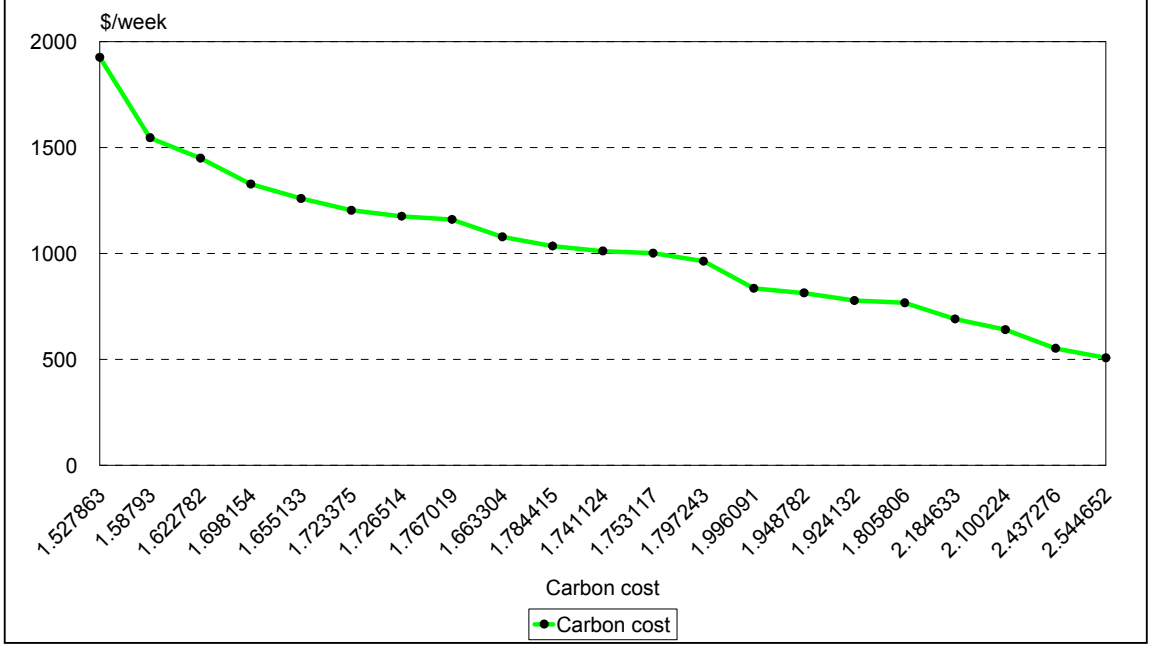


Figure 2(b): Australian households - carbon cost at $25 as per cent of income versus weekly expenditure

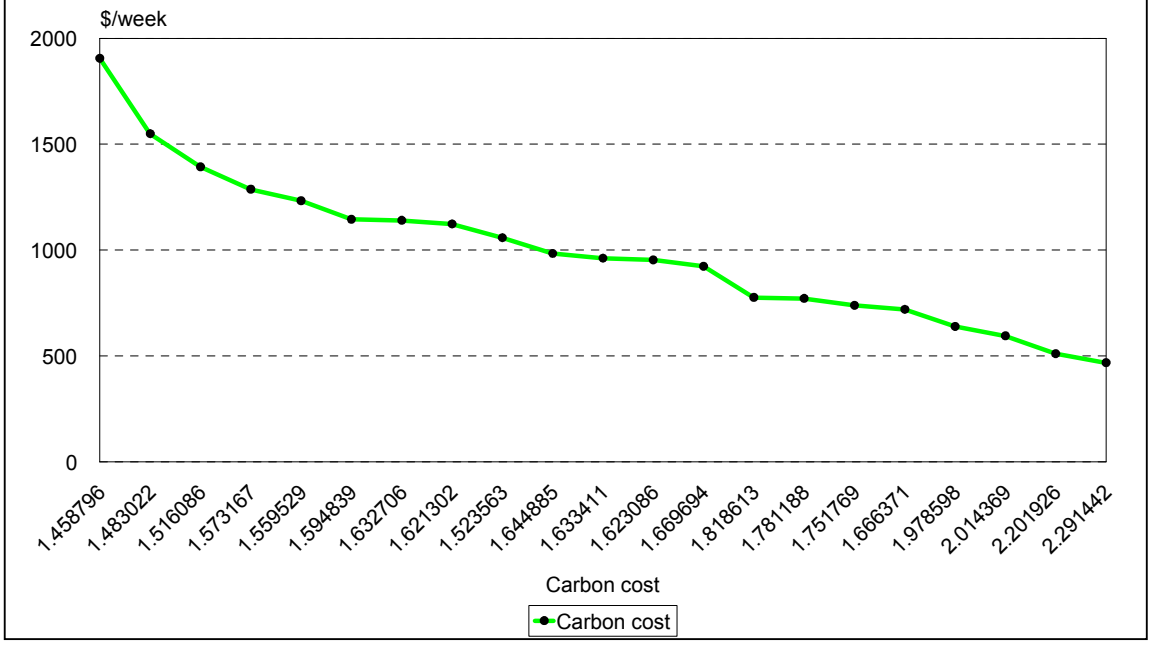


Figure 3(a): Victorian households - carbon cost at $25 as per cent of income versus equivalised weekly expenditure

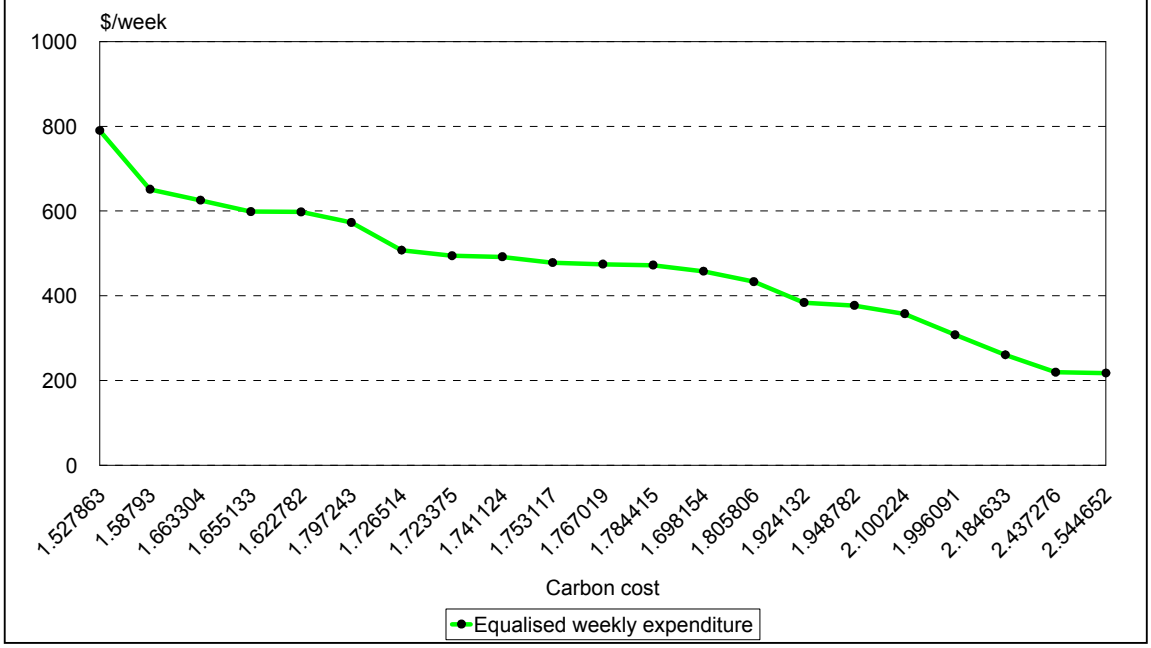


Figure 3(b): Australian households - carbon cost at $25 as per cent of income versus equivalised weekly expenditure

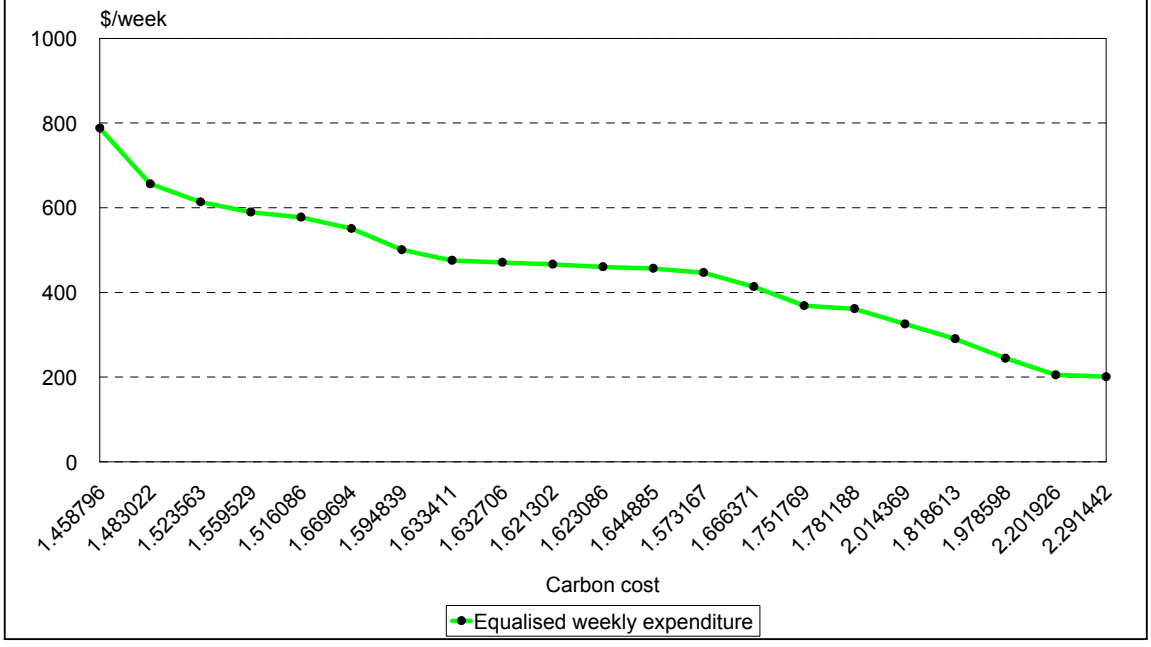


Figure 4(a): Victorian households - utility adjusted carbon cost at $25 as per cent of income versus equivalised weekly expenditure

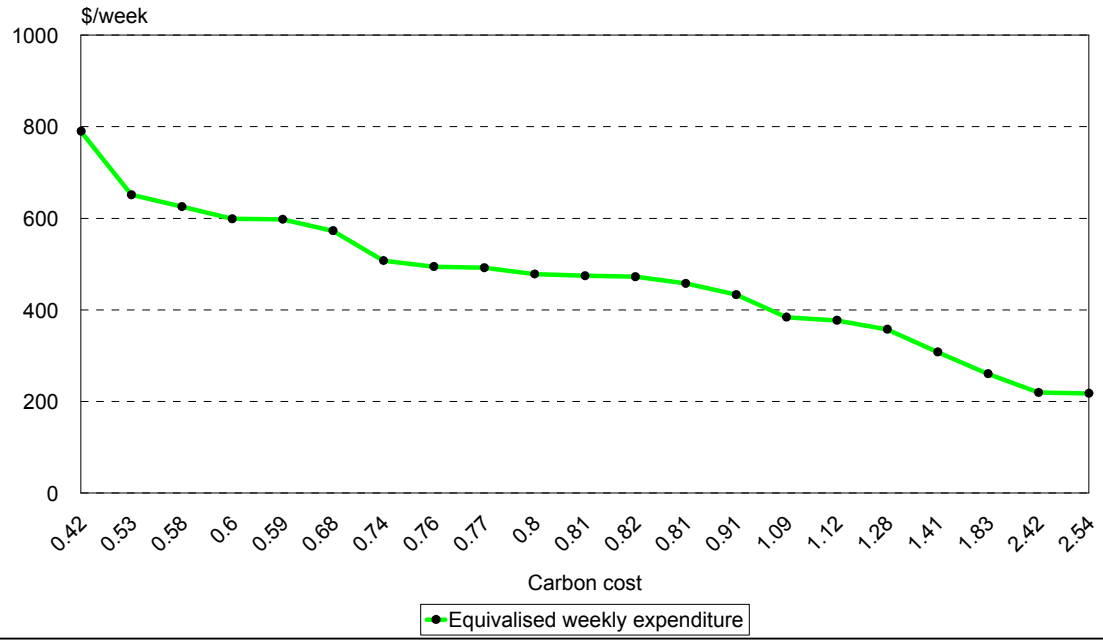
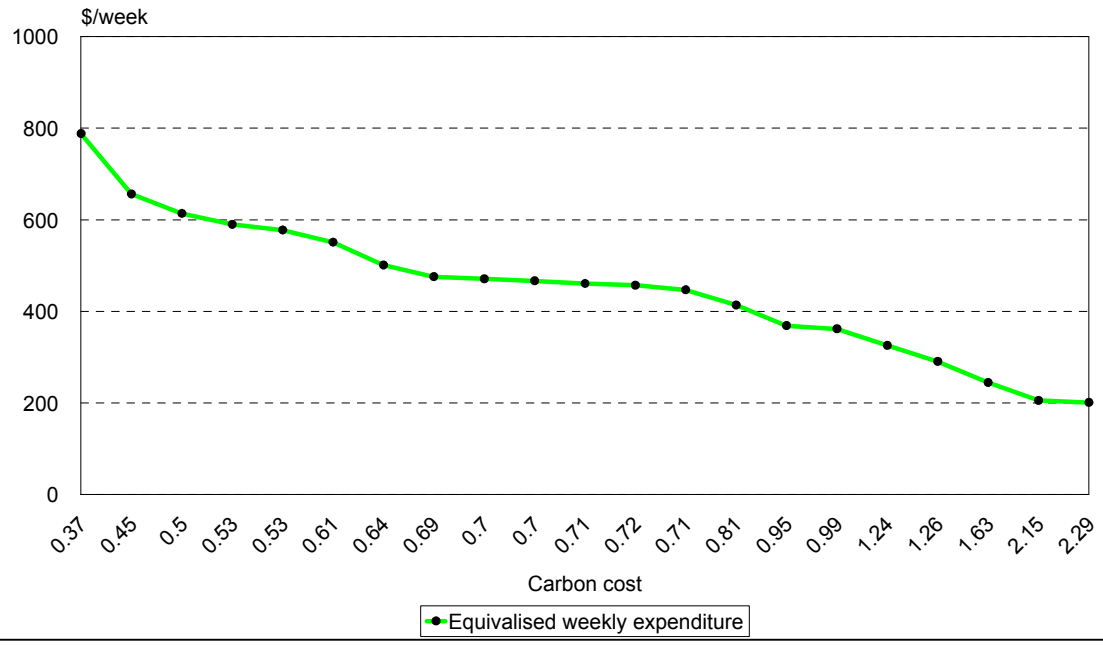


Figure 4(b): Australian households - utility adjusted carbon cost at $25 as per cent of income versus equivalised weekly expenditure



6. Carbon pricing – implications

If the above results are found to be still valid at the time of the implementation of a full carbon price regime, then the income of poor household support to:

(i) offset the cost of carbon; and

(ii) help adjust to a lower carbon intensive economy,

will be high on the political agenda.

Table 7 gives the estimates of the number of households by income ranges that would be the focus of attention. There are around 600,000 of these households that would have an imposed cost of approximately $400 million for a $25 a tonne carbon price and $800 million for a $50 a tonne carbon price. These estimates should form the foundation of calculations for the resource assistance costs of these households.

Finally, it should be noted that State Governments have already put in place measures (such as renewable energy use) which, in effect, are imposing a carbon price on the economy. The impact of current measures by 2010 is shown in Table 8. Currently in Victoria the measures are equivalent to a carbon price of $0.45 a tonne in 2005, increasing to $2.1 a tonne of CO_2 by 2010.

These measures are to be commended with, at this stage, relatively small distributional impacts. What is required now is a full scale debate on how the much larger costs of the future are to be accommodated in the trade-offs between business efficiency, social equity and macroeconomic costs.

Table 7 Number of poorer Victorian households – by income (2006 $)	
Couple with children and income under $900 per week	135,000
Couple with children and income under $800 per week	170,000
One parent family and income under $700 per week	97,000
Non-family households and income under $600 per week	199,000
Total	**601,000**

Table 8 NIEIR's estimates of the impact of measures on electricity prices in 2005 and 2010		
	2005	**2010**
MRET	$0.60/MWh	$1.23/MWh
New South Wales GGAS	$0.88/MWh	$3.10/MWh
New South Wales ESF	$0.53/MWh	$0.50/MWh (2008)
Queensland CEP	$2.00/MWh	$1.50/MWh
Victoria (VREO)	–	$1.50/MWh
Price impacts of above measures by NEM region		
Queensland	$2.60/MWh	$2.73/MWh
New South Wales	$2.01/MWh	$4.83/MWh
Victoria	$0.60/MWh	$2.73/MWh
South Australia	$0.60/MWh	$1.23/MWh
Tasmania	–	$1.23/MWh

Appendix A: Estimating the carbon content of expenditure in the Victorian economy

The CO_2 content of Victorian production will consist of elements, namely:

(i) the direct CO_2 emissions content of production as measured by the energy consumed by an industry;

(ii) the emission content of goods and services used as inputs into production for a given industry from all other industries in Victoria;

(iii) the emission content of goods and services used as input into production for a given industry purchased from all other industries located interstate; and

(iv) the emission content of goods and services used as inputs into production for a given industry produced from industries located overseas.

It is evident from the description of the four elements that the only way to estimate the emission content of production is via input-output analysis.

A typical input-output table of inter-industry flows is represented by:

Industry	1	2		
	x_{11}	x_{12}	x_{1n}	f_1
	x_{21}	:	:	
	:	:	:	:
	:	:	:	:
	:	:	:	:
	x_{n1}	:	x_{nn}	f_n

Where:

x_{ij} = purchase of goods or services by industry j from industry i, \$ million;
fi = industry i contribution to final demand, \$ million.

Now each x_{ij} will consist of three locations in terms of sources of supply j, that is:

$$x_{ij} = x^{v}_{ij} + x^{i}_{ij} + x^{f}_{ij}$$

Where:

x^{v}_{ij} = that part of the x_{ij} total purchase that represents purchases from other firms in industry i located in Victoria;

x^{i}_{ij} = that part of the x_{ij} that represents goods or services purchased from firms in industry i located interstate; and

x^{f}_{ij} = that part of the x_{ij} total that is purchased from other firms in industry i located overseas.

Tables with only the x^{v}_{ij} in the cells are called input-output tables with direct allocation of imports. Input-output tables with x_{ij} in the cells are called tables with imports allocated indirectly.

The first step is to estimate the direct CO_2 content by Victorian industry. This is given by:

$$CO_2{}^d{}_i = C_c \,.\, x_{c,i} + C_g \,.\, x_{g,i} + C_p \,.\, x_{p,i} + C_e \,.\, x_{e,i} \quad (1)$$

Where:

$CO_2{}^d{}_i$ = direct CO_2 content of industry i;

$X_{c,i}$ = direct coal input into industry i measured in $ million (or petajoules);

C_1 = CO_2 emissions in tonnes for coal and as a primary fuel;

And $\begin{pmatrix} c \\ g \\ p \\ e \end{pmatrix}$ = $\begin{pmatrix} \text{coal} \\ \text{gas} \\ \text{petroleum} \\ \text{electricity} \end{pmatrix}$

The second step is to calculate the indirect contribution of all Victorian industry to the emission content of any given Victorian industry. This can only be done by the use of input-output techniques.

The equations for the total direct and indirect CO_2 emission content for Victorian industry are given by:

$$CO_2{}^v{}_1 = a_{1,1} \,.\, CO_2{}^v{}_1 + a_{2,1} \,.\, CO_2{}^v{}_2 + \ldots\ldots + a_{n,1} \,.\, CO_2{}^v{}_n + CO_2{}^d{}_1 \quad (2)$$

$$\vdots$$

$$CO_2{}^v{}_n = a_{n,1} \,.\, CO_2{}^v{}_n + a_{n,2} \,.\, CO_2{}^v{}_2 + \ldots\ldots + a_{n,n} \,.\, CO_2{}^v{}_n + CO_2{}^d{}_n$$

Where:

$CO_2{}^v{}_i$ = total emission content of industry i from Victorian industry;

$a_{i,j}$ = share of Victorian industry i's output allocated to Victorian industry j.

The solution becomes:

$$\boldsymbol{CO_2{}^v} = \boldsymbol{[I - A]^{-1}\ CO_2{}^d} \quad (3)$$

Where:

$\boldsymbol{CO_2{}^v}$ = n * 1 vector of the $CO_2{}^v{}_i$

$\boldsymbol{A}$ = n * n matrix of the $a_{i,j}$

$\boldsymbol{CO_2{}^d}$ = n * 1 vector of the $CO_2{}^d{}_i$

$\boldsymbol{I}$ = n * n unity matrix.

The indirect contribution of Victorian industry to emissions in industry i will be given by:

$$CO_2{}^{vi}{}_i = CO_2{}^v{}_i - CO_2{}^d{}_i \quad (4)$$

The total emissions content will be given by:

$$CO_{2i} = {CO_2}^{v}{}_{i} + {CO_2}^{is}{}_{i} + {CO_2}^{f}{}_{i}$$

Where:

${CO_2}^{is}{}_{i}$ = emission content of industry i from goods and services from interstate industries;

${CO_2}^{f}{}_{i}$ = emission content of industry i from goods and services sourced from overseas.

In order to estimate the interstate contribution to emissions the following data is required:

$$\begin{matrix} {x^{i}}_{1,1} & {x^{i}}_{1,2} & \ldots\ldots\ldots\ldots & {x^{i}}_{1,n} \\ \vdots & & & \\ \vdots & & & \\ \vdots & & & \\ \vdots & & & \\ {x^{i}}_{n,1} & \ldots\ldots\ldots\ldots\ldots & & {x^{i}}_{n,n} \end{matrix}$$

Where:

${x^{i}}_{i,j}$ = imports from interstate industry i used by Victorian industry j.

Therefore:

$$CO_{2i}^{is} = \sum_{j=1}^{n} . \ \overline{CO_{2i,j}}^{is} \ . \ {x_{i,j}}^{i} \qquad (5)$$

Where $\overline{CO_{2j}}$ is the total emission content of interstate industry j per dollar of output.

A similar equation to (5) applies for foreign imports.

Appendix B: Definitions

1. Social Security Type 1 Family With Dependent Children

Where total weekly unearned income as a percentage of total gross Income exceeds 30 per cent AND the household has dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

2. Social Security Type 2 Family With Dependent Children

Total weekly household income from Government benefits as a percentage of weekly household employee income exceeds 30 per cent AND the household has dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

3. Social Security Type 3 Family With Dependent Children

Where Principal source of household income is derived from one of the following:

- other private income;
- age and disability support payments;
- unemployment;
- education and sickness benefits;
- other Government pensions and benefits; and
- the person has zero or negative total weekly income.

AND the household has dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

4. Retired Person/Age Pension

These are retired Households age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit

5. Singles/Couples No Child

Households that are either singles or couples without children.

6. Social Security 6 Family With Dependent Children

Satisfies the following criteria:

- NOT a (retired Household age >55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit) AND
- Family structure with dependent children AND

- Households is not covered by Social Security Type 1

OR

- Family structure with dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

7. Social Security Type 7 Family With Dependent Children

Satisfies the following criteria:

- NOT a (retired Household age >55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit) AND

- Family structure with dependent children AND

- Households is not covered by Social Security Type 2

OR

- Family structure with dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

8. Social Security Type 8 Family With Dependent Children

Satisfies the following criteria:

- NOT a (retired Household age >55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit) AND

- Family structure with dependent children AND

- Households is not covered by Social Security Type 3

OR

- Family structure with dependent children AND is NOT a (retired Household age>55 where no other family member works OR the household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit)

9. Age Pension

The household receives Vet Affairs Pension, Age Pension or Overseas Pension or Benefit.

10. Employed Families

The household income is from employment.

11. Unemployed Families

Households with:

- dependent children, and
- the spouse of the household head is unemployed or not in the labour force, and
- the household head is not over 55 and out of the labour force, and
- no other member of the family is in the labour force, or
- the household does not receive Vet Affairs Pension, Age Pension or Overseas Pension or Benefit.

12. Other

Not included in categories 9, 10 or 11.

13. Low Income (Working Age) < 60K

Households of working age with annual income less than $60,000.

14. High Income (Working Age) < 50

Households with high income > $60,000 per annum (working age) < 50 years.

15. High Income (Working Age) > 50

Households with high income > $60,000 per annum (working age) > 50 years.

16. DINKS

Dual income households without children.

17. Self Employed

18. Wage and Salary Earners

19. Tertiary Educated

20. No Post School Education

21. Intermediate Qualifications

22. Mortgaged Household

23. Renters

24. Owners

25. House Hold with small Travel Costs

26. Extremely Poor Households

Household experienced at least four of the following:

- 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 meals, or
- was unable to heat the home due to a shortage of money, or
- had cash flow problems during the past year, and
- the household head is not over 55 and out of the labour force, and
- no other member of the family is in the labour force, or
- the household does not receive Vet Affairs Pension, Age Pension or Overseas Pension or Benefit.

27. Social Security 1 DSP

Sub group of type 1: Household income from Disability Support Pension.

28. Social Security 1 Unemployed

Sub group of type 1: Household income from Unemployment Benefits.

29. Social Security 1 Poor

Sub group of type 1: Household also meets criteria for poor.

30. Social Security 1 Other

Remaining sub group of type 1.

31. Social Security 2 DSP

Sub group of type 2: Household income from Disability Support Pension.

32. Social Security 2 Unemployed

Sub group of type 2: Household income from Unemployment Benefits.

33. Social Security 2 Poor

Sub group of type 2: Household also meets criteria for poor.

34. Social Security 2 Other

Remaining sub group of type 2.

35. Social Security 3 DSP

Sub group of type 3: Household income from Disability Support Pension.

36. Social Security 3 Unemployed

Sub group of type 3: Household income from Unemployment Benefits.

37. Social Security 3 Poor

Sub group of type 3: Household also meets criteria for poor.

38. Social Security 3 Other

Remaining sub group of type 3.

39. Managers/Professionals

40. Associated/Trades

41. Other Working Household

42. ICONS

Household structure that:

- could not afford to have a holiday once a year, and
- could not afford to have a night out once a fortnight, and
- could not afford to have friends or family over for a meal once a month, and
- could not afford to have a special meal once a week, and
- could not afford brand new clothes, and
- could not afford to spend time on leisure/hobby activities, and
- can afford to pay gas, electricity, telephone bills, registration and insurance on time, and
- did not seek some form of welfare assistance due to a shortage of money, and
- expenditure on recreation, personal care and miscellaneous goods and services exceeds 25 per cent of total expenditure on goods and services, and
- principal source of income is not from unemployment, sickness or other government pension,
- and the household head is aged less than 65.

43. Tertiary Educated High Incomes (>60K)

Brotherhood
of St Laurence
Working for an Australia free of poverty

Carbon use in poor Victorian households by local government area

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Introduction

There is growing awareness that significant changes in climate are occurring due to increasing human-generated greenhouse gas emissions. Increasing concentration of carbon and other greenhouse gases in the atmosphere leads to rising temperatures and more extreme, unstable weather. These changes will increasingly have widespread impacts on Australians.

The Australian Government is developing a carbon trading scheme with a price put on carbon and other greenhouse gas generation. Such a scheme is to encourage the movement from carbon-based energy generation to the use of renewable energy sources. The carbon price is yet to be determined in Australia. Stern's report suggests a price of US$25, but subsequent reports indicate that environmental damage is occurring at a faster rate than anticipated, suggesting a much higher price will be needed (Stern 2006, IPPC 2007, Garnaut Climate Change Review 2008).

Whatever the decided price, the result will be an increase in the cost of using carbon-based energy and thus the prices paid by households. This will occur both directly, from energy use in the home and in vehicle usage, and indirectly, through industry passing on the higher costs of production of goods and services.

Carbon use for 20 Victorian household types was assessed in a study by the National Institute of Economic and Industry Research (NIEIR) for the Brotherhood of St Laurence (NIEIR 2007). The data presented in this paper is drawn from NIEIR estimates of equivalised expenditure by household type in 2006 for each local government area (LGA) in Victoria (2001 boundaries). These estimates were made using microsimulation techniques, using data derived from the ABS Household Expenditure Survey 2001–02, the 2001 Census of Population and Housing and Social Security data bases and the national income and output tables 2001–02. Expenditures were derived for 105 expenditure classifications.

This paper shows the mapping by Victorian and Melbourne LGAs for households classified by the source of their income as poor households. They are defined as households with dependent children where the principal source of income is derived from government pensions and/or benefits. While these households have limited incomes, they are not all the poor households in Victoria. The estimates of carbon use within each Victorian LGA for these households were derived by multiplying the value of expenditure on each item by the estimated carbon content. The estimates of carbon content included both direct carbon content of products and the embedded carbon in that expenditure. The estimates were reviewed to ensure that there was no double counting of carbon in the expenditure categories.

Two maps in the Appendix (Figures A1 and A2) provide the names of LGAs for rural Victoria and Greater Melbourne, and can be used for area identification.

This mapping exercise is to illustrate the point that households vary in their carbon use. The introduction of a carbon price will impact differently on households according to their location, even those households with similar levels of income.

Poor households

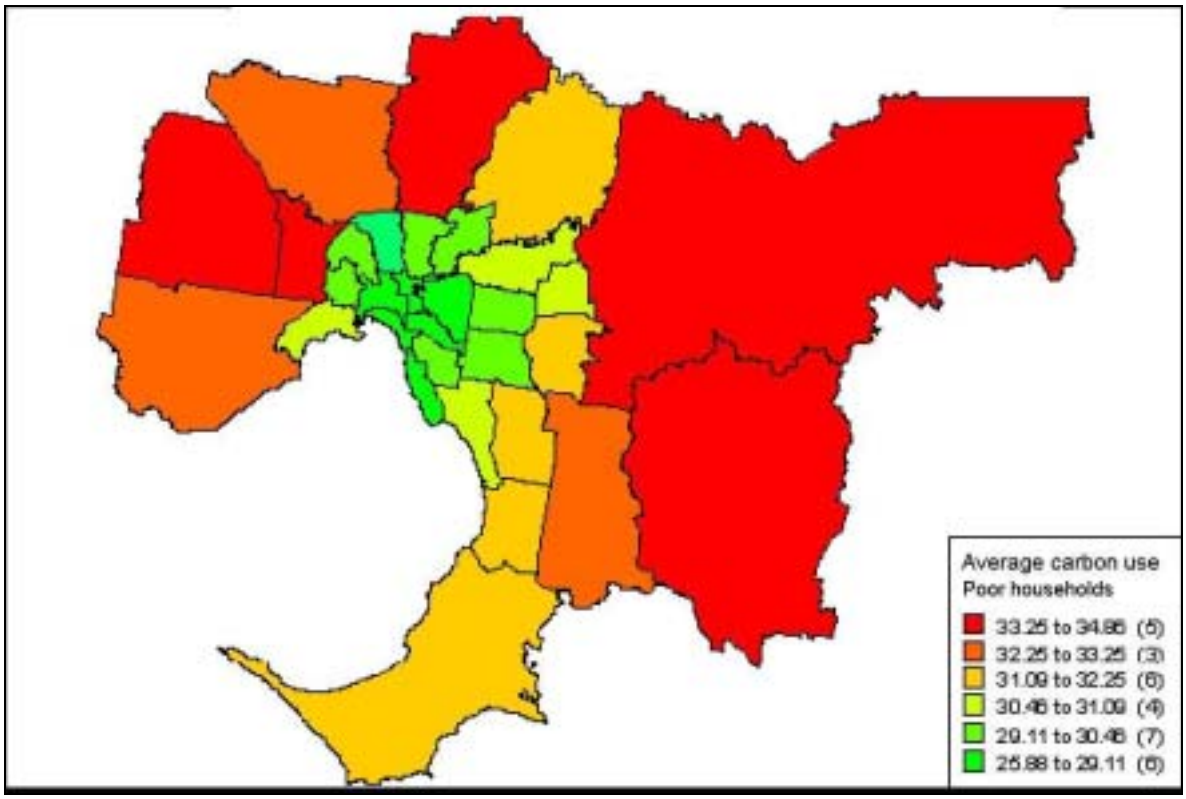
Carbon use

This selected group of poor households represents 12.4% of households in Victoria. The average annual consumption of CO2 for this group for the whole of Victoria is 34.7 tonnes, a little below the average Victorian household consumption of 36.5 tonnes (NIEIR 2007).

Metropolitan Melbourne

Figure 1 shows the average carbon usage in metropolitan Melbourne for the selected group of poor households. The figures in parentheses on the map legend show the number of LGAs within each range of carbon use.

Figure 1: Average annual use of CO2 (tonnes) by poor households in Melbourne LGAs 2006



The average carbon use for poor people ranges from 25.9 to 34.9 tonnes annually between LGAs. The highest carbon use tends to be in the outer metropolitan areas of Melbourne, particularly Melton, Brimbank, Yarra Ranges and Cardinia. Poor residents of Whittlesea have CO2 use 10 % higher than the state average. Carbon use is lower in LGAs closer to the City of Melbourne.

A possible explanation for this is the variability of accessibility to public transport. The poor residents of LGAs with high carbon use, with the exception of Brimbank, have a relatively low expenditure on public transport, but a correspondingly greater expenditure on private vehicles. It is also worth noting that within these areas there are fewer high order service centres such as hospitals, medical specialists, government offices and technical specialists, necessitating travel to obtain these services.

The six LGAs with average carbon expenditures for poor households 10% or more below the state average are Boroondara, Stonnington, Yarra, Bayside, Port Phillip and Melbourne. All are inner middle suburbs with good access to high-quality public transport. In these areas, expenditure on petroleum products, motor vehicles and mechanical repairs tends to be well below the average for this household type, suggesting that they are using public transport. This underscores the importance of public transport in reducing the household use of carbon.

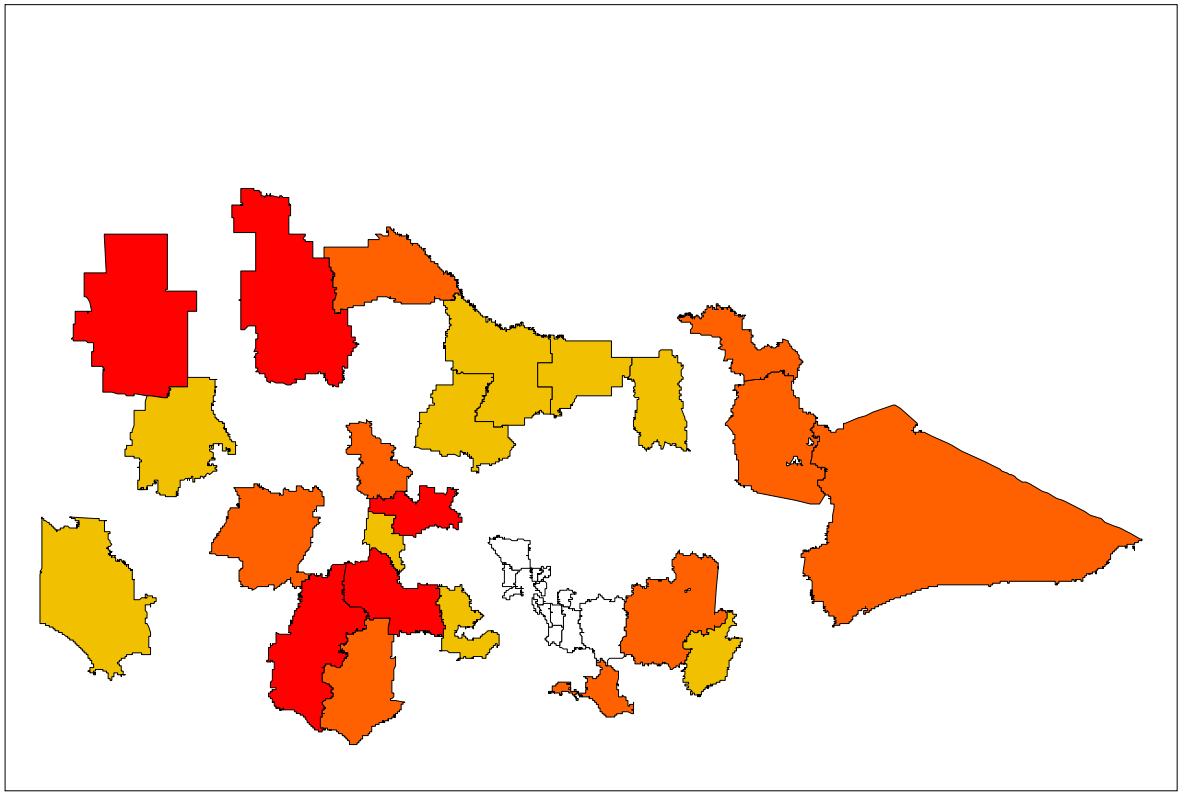
While households in Boroondara and Bayside have below average expenditure on road transport, Darebin and Maribyrnong residents have a relatively high expenditure on road transport but relatively low totals for consumption of carbon. Given that Darebin and Maribyrnong are fairly well served by public transport, the reasons for this need further investigation. It may be that there

are public transport gaps for some essential trips, necessitating car ownership, but as is the general pattern with car ownership in poorer families, fewer car trips are made than in wealthier car-owning households, thus reflecting the lower carbon usage.

Rural Victoria

The average carbon expenditure for poor households in rural Victorian LGAs is shown in Figure 2. The figures in parentheses on the map legend show the number of LGAs within each range of carbon use.

Figure 2: Average annual use of CO2 (tonnes) by poor households for rural LGAs in Victoria 2006



The average annual use of CO2 per Victorian LGA for this selected group of poor households ranges from 28 to 37.3 tonnes. This is a much higher carbon use than in metropolitan Melbourne.

The LGAs where the estimated average CO2 use for poor households is more than 10% higher than the Victorian average for this household type are West Wimmera, Golden Plains, Yarriambiack, Loddon, Hindmarsh and Buloke.

One common feature of these LGAs is the absence of a major service centre and the limited availability of public transport. Hence residents need to travel long distances by car to meet anything greater than the immediate local service needs. In each of these areas, petroleum product purchases account for over 4% of total expenditures compared with a Victorian average of 3.4% for this type of household. Similarly, expenditure on the purchase of motor vehicles (4.3% to 5.8%) exceeds the Victorian average of 3.4%. Expenditure on electricity by the households in these LGAs is close to the state average but gas expenditure is slightly lower, reflecting the unavailability of mains gas in these areas.

Only 7 of the 49 rural LGAs have a carbon consumption below the Victorian average. The lowest carbon use areas include Wodonga and the alpine resort areas. Municipalities further from

Melbourne with a larger urban centre, such as Horsham, Ballarat, Greater Bendigo, Greater Shepparton, Benalla and Wangaratta, have carbon consumption closer to the Victorian average.

Conclusions

This mapping exercise indicates the spatial variation in carbon use, even for households with similar incomes. Much of the explanation for this variance in use appears to cluster around transport and urban planning issues. In both metropolitan Melbourne and the rest of the state, the data suggests that people with low incomes tend to use public transport where it is available, in preference to expenditure on private vehicles. However, in areas with no or poorer public transport, there is an increased expenditure on private vehicles and related products.

The problem of mobility for poor households is compounded in some LGAs by lack of local infrastructure such as specialist services and shopping and business centres. This raises the important issue of how people living on low incomes can be assisted both through the provision of public transport and through improved urban planning, so that the need to travel is reduced. This mapping of carbon use shows the importance of these factors for improving the well-being of low income Australians, as a good public transport system will reduce their costs of mobility. The provision of public transport also reduces the total carbon usage by households.

These findings support other research on low income households and public transport which identifies the outer LGAs in Australian cities as transport-disadvantaged (Currie & Senbergs 2007b, Hurnie 2006). Currie and Senbergs rated the supply of public transport according to Census Collector Districts. The lowest public transport availability scores were for Mornington Peninsula, Casey, Cardinia, Yarra Ranges and Nillumbik. This is a similar pattern to the high carbon usage in metropolitan Melbourne found in this study, with the exception of Mornington Peninsula which did not have the highest category of carbon use. It is likely that poor people living in the Mornington Peninsula travel less, the area being more self-sufficient for services.

Work by Currie and Senbergs (2007a) also shows that some transport-disadvantaged Victorian households are ‘forced’ into car ownership in order to achieve mobility. They found that 20,831 metropolitan Melbourne households with a weekly income below $500 run two or more cars. A study on the bus service use in Pakenham, Victoria, has shown that people are using new bus services when they are made available and this has reduced their social exclusion (Bell et al. unpub.).

Imposing a carbon price will not only disproportionately adversely impact low-income households (NIEIR 2007), but will also have a greater adverse impact on those low-income households which have limited or no access to public transport, as well as those households in neighbourhoods affected by poor urban planning. A carbon price will have a greater adverse impact in many parts of rural Victoria than in metropolitan Melbourne, because of the more extensive lack of public transport. Assuming no ameliorating factors, such as behavioural change and government assistance, at a carbon price of A$35/tonne, the additional cost to this group of poor households in the 5 highest average carbon use metropolitan LGAs will range from $1164 to $1220 a year. Given the same scenario, the additional cost in the 14 highest average carbon use rural Victorian LGAs will range from $1173 to $1306 a year.

Solutions lie in improved urban planning and improved public transport. As Davison (2008) noted, it is no longer good enough to release new residential land without a transport plan. The real need to reduce carbon usage also necessitates urban planning which requires less travel for people to reach services. For example, all railway stations should be surrounded by more intensive housing developments which include low-income housing.

A study of the transport needs for groups of people at risk of social exclusion in the regional area of Warrnambool made a series of recommendations to improve the availability and effectiveness of

public transport (Stanley & Stanley 2004). These included increased frequency and span of route bus services; new services; improved provision for users, such as three-hour tickets instead of two-hour tickets; regulatory reform, such as allowing members of the public on school bus services and improved system planning through the establishment of Regional Accessibility forums.

A price on carbon is vital policy to encourage movement away from goods and services with a high carbon content. However, this needs to be introduced with supporting policy which addresses the regressive nature of such a price and specifically assists poor households to move to low-carbon alternatives.

References

Bell, D, Currie, G, Stanley, J & Fletcher, M (unpublished) 2006, Buses in outer suburban Melbourne, Multi-modal Transport Solutions.

Currie, G & Senbergs, Z 2007a, *Exploring forced car ownership in metropolitan Melbourne*, paper presented at 30th Australasian Transport Research Forum, Melbourne, 25–27 September.

Currie, G & Senbergs, Z 2007b, *Identifying spatial gaps in public transport provision for socially disadvantaged Australians: the Melbourne 'needs-gap' study*, paper presented at 30th Australasian Transport Research Forum, Melbourne, 25–27 September.

Davison, G 2008, 'Stuck in our cars on the highway to hell', *The Sunday Age*, 30 March, p.19.

Garnaut Climate Change Review 2008, *Emissions trading scheme discussion paper*, viewed 20 March 2008, <http://www.garnautreview.org.au/CA25734E0016A131/WebObj/ETSdiscussionpaper-March2008/$File/ETS%20discussion%20paper%20-%20March%202008.pdf>.

Intergovernmental Panel on Climate Change (IPCC) 2007, *Climate change 2007: synthesis report: contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change*, [Core Writing Team, R K Pachauri & A Reisinger (eds)], IPCC, Geneva, viewed 20 March 2008, <http://www.ipcc.ch/ipccreports/ar4-syr.htm>.

National Institute of Economic and Industry Research (NIEIR) 2007, *The impact of carbon prices on Victorian and Australian households: a report for the Brotherhood of St Laurence*, viewed 31 March 2008, <http://www.bsl.org.au/pdfs/NIEIR_Impact_of_carbon_prices_on_Vic&Aust_households_final_May2007.pdf>.

Stanley, J & Stanley, J 2004, *Improving public transport to meet community needs: a Warrnambool case-study*, Bus Association Victoria and Warrnambool Bus Lines.

Stern, N 2006, *Stern review on the economics of climate change*, HM Treasury, London, viewed 20 March 2008, <www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm>.

Appendix

Figure A1 Local Government areas in metropolitan Melbourne

Source: Municipal Association of Victoria website November 2007. Used by permission.

Figure A2 Local Government Areas in rural Victoria

Source: Municipal Association of Victoria website November 2007. Used by permission.