



LOW CARBON LIVING
CRC

RP3001: Household energy use

Consumption and expenditure patterns 1993-2012



Authors	Burke, Terry and Ralston, Liss
Title	Household energy use: Consumption and expenditure patterns 1993-2012
ISBN	
Format	
Keywords	
Editor	
Publisher	CRC for Low Carbon Living
Series	
ISSN	
Preferred citation	



Australian Government
Department of Industry and Science

Business
Cooperative Research
Centres Programme



LOW CARBON LIVING
CRC

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EXECUTIVE SUMMARY

One of the biggest institutional hurdles to making a transition to a lower carbon society is 'the dominant economic paradigm of unconstrained and unsustainable consumption' (Wiseman 2014). Key players in this consumption process are households. Thus this report uses data from ABS Household Expenditure Surveys (HES) for 1993-94 and 2003-04 and the Housing Energy Consumption Survey of 2012 to examine the changing nature of household energy use (electricity, gas, and motor fuel) over the last two decades, and to assess the impact of these costs on the household budget. The analysis of budgetary impacts is in part designed to complement, and expand on, the Australian research and literature on gas and electricity fuel poverty and hardship. No equivalent concept of hardship exists for motor fuel. It can be argued that an understanding of the budgetary impacts of fuel prices on households is required to better gauge potential household resistance to policy reform directed toward a low carbon society, Public resistance to the carbon tax may be seen as an example of the difficulties encountered when energy costs are seen to be linked to such policy.

The concept of fuel poverty in relation to gas and electricity is a British one, with a lineage tracing back to the 1970s, and was initially as much concerned with establishing a benchmark for adequacy of heating as with the proportion that energy costs impose on the household budget; the latter was meant to be no more than 10 per cent of the household budget. It is arguable, however, in the Australian context, (a) whether 10 per cent of income committed to gas and electricity costs is a relevant measure of the problem and (b) whether fuel poverty is the appropriate term, as it implies that fuel or energy costs have a role in pushing people below a poverty line. Perhaps the more appropriate term is therefore 'energy hardship'.

The findings presented in this study complement the research of Richardson and Travers (2002), Chester and Morris (2012), and Nance (2013) on fuel poverty, and provide an historical perspective rather than just being snapshots at a point in time. Key findings in relation to electricity and gas include:

- The cost of gas and electricity, as a proportion of the household budget, was much the same in 2012 as in 1993. For all households in the survey, median energy costs as a percentage of disposable household income was 2.7 per cent in 1993-94 and 2.8 per cent in 2012. This would suggest that the arguments that electricity industry liberalisation has created new levels of fuel hardship may not be accurate.
- One of the reasons for the lack of change over time is that household disposable income rose at much the same rate as gas and electricity prices. Thus there were not the budgetary pressures to make major changes to household gas and electricity expenditure. Moreover the substantial time period also meant households had the opportunity to make adaptations, both consciously and unconsciously, to reduce the impact of gas and electricity price rises on the household budget.
- Analysis found that type and size of dwelling had an independent effect on energy consumption. For the same household type in each dwelling type, the amount spent on energy rises as the dwelling becomes larger, more so for couples and couples with children than for singles. For example, in 2012, for couples in a detached house, the median cost of electricity and gas rises from \$22 per week for a one bedroom dwelling to \$36 per week in a four bedroom dwelling. For the same household type in a flat, the median cost rises from \$23 a week to \$33.
- In terms of energy hardship, defined as more than 10 per cent of household disposable income being committed to gas and electricity costs, the findings here reaffirm other studies that show hardship is concentrated in the lowest income quintiles. Thus for those who were in the lowest income quintile, 11.3 per cent were in energy hardship as measured by the '10 per cent ratio' in 1993-94, increasing to 17.9 per cent in 2012. This suggests that low income households, for whatever reason, found it harder to adapt their energy budget to either rising costs or consumption needs.
- The benchmark of 10 per cent or more of household budget expended on energy (often used as a measure of energy poverty) is nevertheless not a very good measure of hardship: only 16 per cent of those reporting an 'inability to pay bills' (a more robust measure of hardship), spent more than 10 per cent of their budget on electricity and gas. There are obviously many households paying relatively low percentages of their income on electricity and gas who nevertheless experience stress in paying gas and electricity bills.
- Using inability to pay gas and electricity bills as the measure of hardship the evidence shows that singles (but not older singles), families with larger number of children and renters were more likely to experience an inability to pay.
- A majority of those households (57 per cent) who reported an 'inability to pay bills' had a housing affordability problem. This suggests that for many

households there is a systemic underlying problem in capacity to pay gas and electricity bills.

- Related to this, there is little evidence of excessive fuel costs being the cause of the inability to pay. The major factors are unemployment, dependence on government income support (other than the aged pension), residence in the private rental sector and housing affordability.

The study also investigated the impact of fuel costs (petrol, diesel and automotive gas). The key findings include.

- Rising fuel costs (as with electricity and gas) have clearly dictated adaptive behaviours to the extent that what little change there has been in household expenditure over the two decades has been downwards; only 11.8 per cent of households in 2012 spent more than 10 per cent of their income on fuel, compared to 14.1 per cent in 1993-94.
- The burden of motor fuel costs falls more on lower income households, but not to the same degree as for gas and electricity. Moreover the cost burden for this income group declined between 1993-94, when fuel accounted for 7.9 per cent of household income, and 2012, when it was 5.9 per cent. The reduction in expenditure on fuel as a proportion of income suggests behavioural adaptations by households.
- As useful as these adaptations might have been for reducing the budgetary burden of fuel costs, there have been only very small changes in measures such as litres per kilometre, commuter patronage, and kilometres travelled. This raises questions about the rapidity of the pace at which households can make the transformational changes required for a low carbon society.
- In terms of what might be called motor fuel hardship i.e. measured as more than 10 per cent of income committed to motor fuel costs, there has been little change over time: in 1993-94, 21.5 per cent of households were in this category, and in 2012 the figure was almost the same at 20.9 per cent.
- Not surprisingly, motor fuel costs are indirectly related to dwelling type. Households in detached dwellings had median weekly motor fuel costs of \$60, while for those in flats of 1 and 2 storeys (the old 1960s and 70s walk ups) spent \$35 per week. This is likely to be because multi unit dwellings (a) accommodate smaller households who need fewer cars; (b) do not have the space to accommodate multiple vehicles; and (c) are more likely to be located in areas where public transport can be substituted for a car. We can hypothesise that as more Australians transition to multi-unit living,

relatively fewer motor vehicles will be required per dwelling. This however will be a very slow process, given the resistance, and implementation hurdles, to greater multi unit living.

The report concludes with observations about why, given the much greater impact of motor fuel than of electricity or gas on the household budget, it does not get media attention in terms of hardship, and why there is no equivalent to electricity and gas 'fuel poverty' for motor fuel. Explanations include the different nature of the client-provider relationship, the absence of a concept of disconnection for motor fuel, and a perception (misplaced in many respects) that motor vehicle users have choices in ways that utility users do not.

INTRODUCTION

Energy use is integral to our lives as without it the material standard of living Australians currently enjoy would be impossible. However this standard of living comes at a cost: it is based on consumption of energy at rates which are both some of the highest and fastest growing in the world (Energy Realities, 2012). This level of energy consumption creates enormous challenges if the goal is to move to a low carbon future.

Given that residential consumption accounts for around 30 per cent of total Australian energy consumption (IEA 2014 Australia Table 3) a greater understanding of household decision making and choices around energy consumption is required. In making a transition to a low carbon democratic society, the values and behaviour of households is fundamental, because households are not only consumers but also important players in the election process. The hip pocket has always been an important factor in shaping election decision making, and indirectly in determining how political parties conceive of and shape public policy, including environmental policy. As noted in a study of various international de-carbonisation strategies 'the biggest institutional hurdles to making a transition to a lower carbon society is the dominant economic paradigm of unconstrained and unsustainable consumption' (Wiseman 2014, p17). And one of the key players in such consumption is the household.

A companion report to this one (Burke and Ralston 2015) discussed the many drivers of consumer behaviour in relation to energy usage, as well as the different conceptual approaches to explaining household consumption behaviour that are inherent in the various academic disciplines. The nature of these drivers suggests that the transition to low carbon household consumption will be far from easy or quick. The report also canvassed a whole range of policy levers which are available to influence, in various ways – whether this be to manipulate, prompt, nudge, or force - households into lower carbon behaviours, emphasising that the degree to which any one of these levers is effective, and the precise design of any policy instrument within these broad strategies, has to be grounded in a good understanding of what explains household decision making.

If we are to change household behaviour through appropriate policy interventions, we need to have better knowledge about the scale and form of domestic usage and how consumption is changing over time, as well as how it varies across different household arrangements – for instance according to housing type and tenure, age cohorts, income groups, and household types and their associated lifestyles.

Household consumption involves energy use in two ways. Householders consume energy directly, by using electricity, gas or petrol in the dwellings in which they live and to power their motor vehicles. Household energy consumption also occurs indirectly, through consuming goods and services which have energy embodied in their production: that is, energy is consumed in making a dwelling, motor vehicle, and appliances and in getting food into a household's pantry or refrigerator. This latter indirect consumption means that household material consumption accounts, in part, for the substantial proportion of energy that is used by industry. However indirect consumption is not the focus of this report.

The report is concerned with direct energy consumption by households, using ABS data from 1993-94, 2003-04 and 2012. It considers (1) the changing level of household energy expenditure (electricity, gas, and motor fuel) over the last two decades, and (2) the impact of these expenditures on the household budget. Variations in these energy consumption patterns and costs by housing tenure and type, income group, and household type are examined. The main ABS data sources analysed are the 1993-94 and 2003 Household Expenditure Surveys (HES) and the 2012 Household Energy Consumption file from the 2011-12 Survey of Income and Housing (SIH). While ABS data collection processes are sufficiently robust to ensure data quality, there are inevitably limitations that must be considered in their use for policy analysis. For a critical discussion of such issues, with specific reference to household expenditure surveys, see Harque (2005).

While electricity, gas and petrol can be aggregated as energy products, each one of these energy sources has its own set of drivers of consumption and an organisational and institutional context in which that consumption takes place. To make this point at its simplest, household petroleum consumption is linked to motor vehicle usage, while electricity and gas usage are linked to the attributes of the dwelling plus the appliances within the dwelling. But how consumption plays out in actual usage by households is dependent on a host of complex and changing factors. Interpreting the relative importance of these different factors varies, depending to some extent on the analytical tools used to look at the problem. For example neoclassical economics is much more likely to be concerned with prices and incomes, economic sociology tends to focus on institutional and policy factors, while cultural studies might consider societal changes in the importance and meaning of the environment to a household and how these meanings might modify consumption behaviour.

THE CHANGING NATURE OF ENERGY PROVISION

In 2012-13 in Australia, petrol was the main energy source used by households (46 per cent of the total), while electricity provided 20 per cent and natural gas 15 per cent. Other energy sources, e.g. hydro, wood, solar, and wind, accounted for the remaining 19 per cent of household use (ABS 2012-13).

Over the last three decades the environment in which the three key household energy sources has been provided has changed dramatically, with impacts on the costs of these resources and how households think about and use them. Some of the drivers of change are the same for each energy resource, while for others there are distinctive factors at work. Before looking at each energy source separately, some general comments about use and price changes of household energy are necessary. While historical data on household energy consumption over time is valuable, one of the unfortunate side effects of the commercialisation of the sector has been a weakening of the capacity of the industry to supply accessible, reliable, and consistent long term data. A large study by the federal Department

of the Environment, Water, Heritage and the Arts (2008) estimated that residential sector energy consumption (including electricity, gas, LPG and wood) in 1990 was about 299 petajoules (PJ) and that by 2008 this had grown to about 402 PJ. However another government report put consumption higher, at 434.8 PJ in 2008-09, and 454 PJ in 2012-13 (BREE 2010 table 4, 2014 table 4). Assuming consumption for 2008-09 was about 420 PJ (that is, an average of the two estimates) this suggests an annual growth rate of household energy consumption close to or in excess of the rate of household growth up to the late 2000s. Subsequently, however, annual growth of household consumption has been below that of household growth.

It is important to note that it was not until mid-2012 that the increase in energy costs, notably of electricity and gas though not of petrol, exceeded the rate of growth of household income. Prior to that, as Figure 1 shows, household income grew more rapidly than energy prices, suggesting that increasing incomes provided households with the capacity to adapt to escalating costs of energy. The data analysed in this study ends in 2012, and thus misses the full effects of the sharp rise in prices since then. The findings of this report must be qualified by this fact.

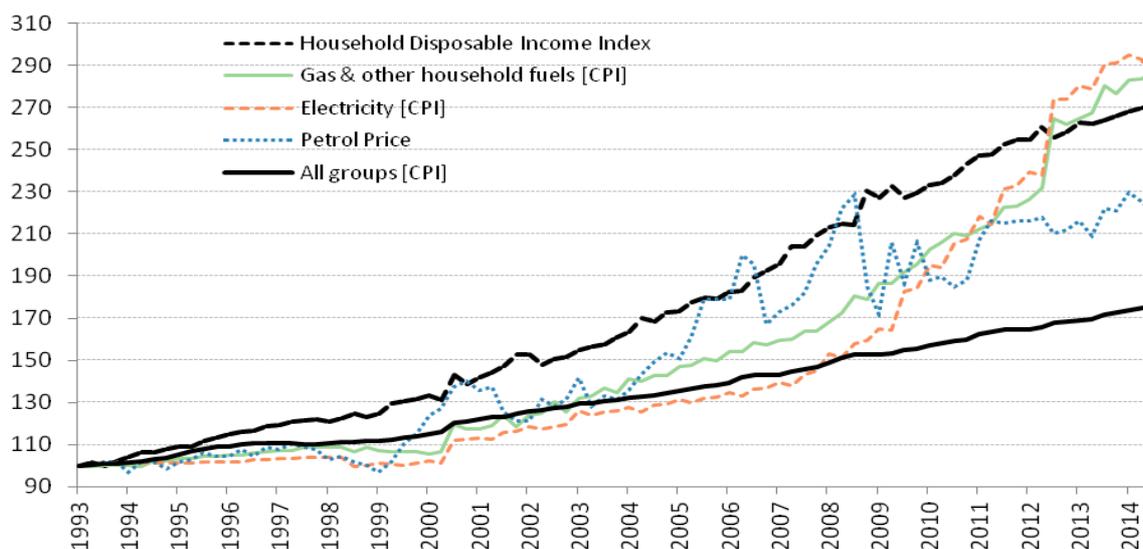


Figure 1: CPI Index of energy prices and household disposable income, Australia, 1993-2014

Source: ABS Consumer Price Index Cat 6401.0 2015

Electricity

Up until the 1990s the major provider of electricity in each state was a state-owned supply authority which managed all three functions of electricity provision - generation, transmission and distribution. Subsequent to that period, and varying from jurisdiction to jurisdiction,

the Australian electricity industry has undertaken radical restructure involving separation of the three functions, corporatisation, and in some cases, privatisation of the pre-existing state-owned supply authorities.

One of the most important changes has been the creation of a National Electricity Market (NEM) whereby almost all electricity generated in Eastern Australia is

competitively traded as a commodity through the NEM rather than being produced and sold by vertically integrated state monopolies. Increased transmission capacity has also allowed trading of electricity across state boundaries, with the intention of further increasing competition. The NEM agency determines the ½ hourly sale price based on generator bids up to the required demand, and dispatches the successful bidders. Electricity retailers purchase the electrical energy at fluctuating wholesale prices and on-sell to consumers at set tariffs. In addition to the tariff for the energy component, retailers pass through network charges from the transmission and distribution network service providers (poles and wires). For residential customers, the cost of these network components is greater than the cost of the energy component (reflecting the low housing density in Australia).

In terms of the objective of creating a low carbon society, electricity in Australia is particularly problematic as black and brown coal account for around 56 per cent of registered generation capacity, but about 78 per cent of output, because many of the bigger base load generators are coal powered (AER 2012, p27). Victoria, New South Wales and Queensland rely on coal to a greater degree than other jurisdictions.

Given coal is one of the cheapest sources of fuel for electricity generation, this should flow through to cheap electricity prices and historically this has been the case. Australian electricity tariffs were low compared to equivalent OECD countries for the bulk of the study period (Dickson and Warr 2000, p15, International Energy Agency 2010).

Circumstance began to change in the 2000s. While household prices remained flat for most of the study period in equivalent OECD countries, Australia saw sharp increases, particularly in the late 2000s, such that by the end of that decade they were trending toward the higher end (Electricity Users Association of Australia 2013).

This has principally been the result of the need to replace ageing infrastructure and upgrade network infrastructure nearing full capacity. Unfortunately, unduly conservative assumptions of high growth in demand have led to upgrades beyond that required, resulting in excess capacity being installed in the network, (i.e. so-called gold plating). Some also argue that the industry regulators have allowed excessive profits relative to the low level of risk in the network distribution businesses; that too much has been spent on marketing; and that the industry, particularly the state owned ones, have not achieved full cost efficiency (EUAA 2012, Grattan Institute 2012, Hill 2014). An alternative argument is that prices are not necessarily high overall but just for some consumers, notably those who do not shop around for

the best deal in a deregulated competitive environment (Blowers and Chisholm 2015).

With overall demand for electricity now reducing (due to energy efficiency regulations and growth in solar PV), network utilities are needing to amortize asset values over a smaller volume of electricity, resulting in ongoing high network prices. Furthermore, transition to low carbon energy sources is expected to increase the cost of the electricity generation component. One can conclude that the institutional environment for the provision of electricity has changed in such a way that high electricity prices are permanent and that the days of cheap electricity are over.

It is this pricing pattern for the long term that is important, as it is difficult for households to make the type of adaptations required of price signals in short periods of time. In terms of household energy affordability there appears to be an emerging disjuncture between the direction of energy prices and that of household incomes. Whereas in the two decades to 2012 household incomes rose at rates more or less parallel with electricity prices, this does not look like being the case in the coming decade. If the current state of the economy persists, over ensuing years household incomes are likely to be flat, suggesting the capacity of household budgets to absorb the impacts of high and rising electricity prices will be more constrained than in the past.

Natural gas

Household use of natural gas is mainly for heating and cooking. Australia has large reserves of natural gas, the bulk of it exported in the form of Liquefied Natural Gas (LNG). Of the gas that is used domestically, residential use accounts for only about 16 per cent and that is disproportionately in Victoria. Consumption patterns thus differ sharply from state to state. The distribution costs of gas are higher than for electricity and, given the gas reserves are not located near metropolitan cities (Melbourne excluded), the end cost can be higher and there are fewer households connected as it is only viable to connect to larger population areas. Climate is also an important factor influencing domestic gas usage across jurisdictions: in warmer climates with a dependence on air conditioning, electricity is used more given gas is mainly for heating and cooking.

In the last decade there has been an explosion in the international demand for LNG and Australian producers have responded by ratcheting up exports. This means that Australian gas users must compete with international users for the same product. Many of these overseas users are much larger than Australian companies and thus more attractive to producers,

particularly if they can be locked into long term contracts. Currently (early 2015), there is no government policy, other than in WA, to ensure gas resources are prioritised to supply Australian industry and households. Given these export pressures, and that Australian producers need considerable investment to build adequate capacity for future use, natural gas - like electricity - looks to be set on a path of sustained price increases, but marked by periods of instability because of the volatility of international markets.

Petrol

For Australian households petrol consumption is linked mainly to personal mobility and motor car usage, with petrol little used by households other than for transport, and unlike in some countries it is not an input into making other energy, such as electricity. Compared with other forms of energy, the supply, demand and price of petrol has been much more unstable in the last decade, and thus the cost to households has fluctuated considerably. The cost of petrol in Australia is subject to international trading conditions, unlike electricity (which cannot be traded, although coal, a key input, can be) or gas, of which Australia has large reserves. By contrast, Australia only has limited reserves of petrol, having to import some 82.1 per cent of it and thus having to pay world market prices (Office of the Chief Economist 2014, Table 2). In turn these prices are affected by supply which, in the case of oil, is subject to the vagaries of

politics (including in the fractious Middle East, where a large proportion of the world's oil reserves are located).

The other factor contributing to price volatility is the capacity of the industry to increase supply through new discoveries of reserves or new technologies such as shale oil – the latter, in the course of just a few years, has enabled the USA to move from being a major importer to a net exporter. On the demand side, petrol usage is much more subject to economic conditions and consumers' responses to higher petrol prices – for example, shifts to more fuel efficient vehicles. Thus, prior to the GFC, there was considerable debate as to whether peak oil capacity had been reached and whether escalating prices would continue. Today there is less discussion about peak oil, and changes in the demand-supply relationship mean petrol is cheaper than it was some seven or eight years ago, a feature that became more marked at the end of 2014 when world oil prices plummeted.

One of the important drivers of adaptive household behaviour is not just the rate of increase in petroleum prices but also the absolute level. Figure 2 shows the price of petrol in Australia compared to equivalent countries in October 2014 and illustrates how low they are by international standards. These relativities have broadly remained for the entire twenty year period of this study, so while petrol prices have risen they are still (at least to 2014) not at a level to put the same pressures on the household budget as in most other similar countries.

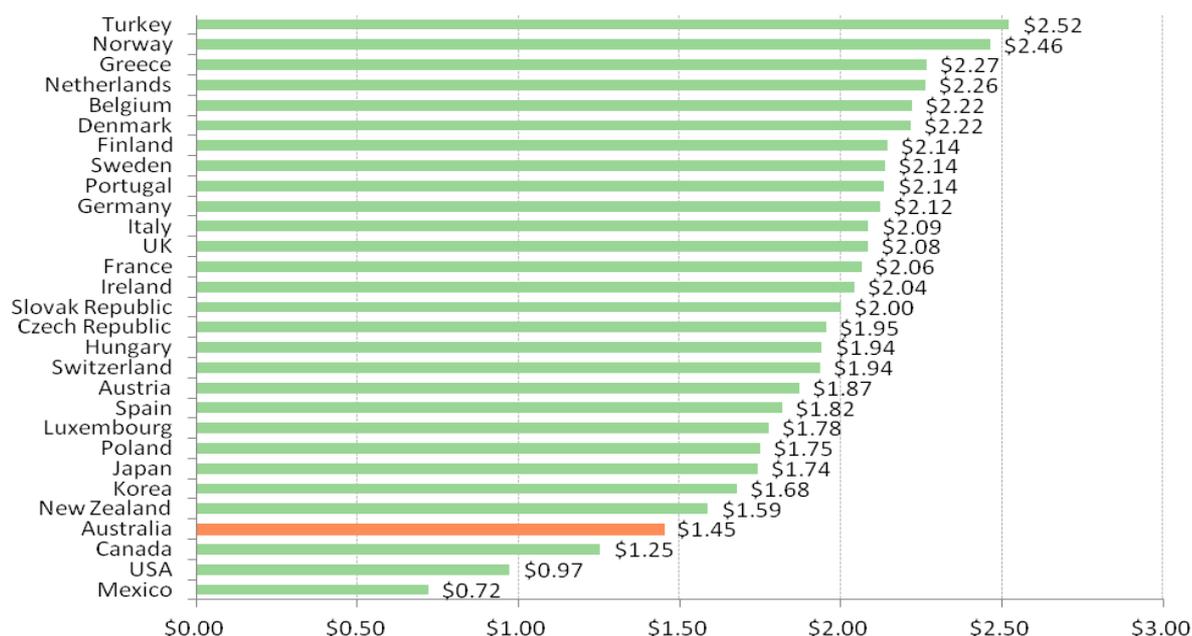


Figure 2: International petrol prices, Australian dollars, 2014

Source. Australian Institute of Petroleum 2014 Petrol Prices and Taxes June 2014

DATA AND METHODOLOGY

This report examines household energy consumption over a period of almost two decades. It compares patterns of consumption and expenditure in 1993-94 with 2012, using ABS Household Expenditure Survey (HES) data for 1993-94 and the Household Energy Consumption Survey (HECS) 2012, which was a component of the 2011-12 Survey of Income and Housing (SIH).

The HES is a national survey undertaken at irregular intervals since the mid-1970s, with a sample size typically of the order of 8,000 to 11,000 households. Its objective is to gather detailed data about household expenditure practices in Australia. The SIH, conducted since 1994, is a complementary survey, designed to provide data about changes in income, demographic and housing circumstances. The second half of the 2011-12 SIH included the Household Energy Consumption survey (HECS), a set of supplementary energy related questions. Additional data collection in the second half of 2012 resulted in a final HECS sample of 11,978 households. The 2012 HECS questions replicate some of the questions in the earlier 1993-1994 HES, enabling comparison across time.

While the ABS tries to maintain consistency in variables over time this is not always possible and there are sometimes comparability problems across years. For this reason data prior to 1993-94 has not been used for this report, and for one part of the analysis data from the 2002-03 HES is used because earlier data was unavailable.

For the purpose of the analyses for this report, the total HES and HECS samples in each case have been reduced, to exclude:

- All households which reported zero or negative incomes.
- Households for which the numbers would be too low for multi variable analysis. These are group households, single parents with four or more children, couples with four or more children, multiple family households and households with only non-dependent, i.e. adult, children.

This left sample sizes of 6,483 households for 1993-94 (or 77 per cent of the households that had been in the original HES sample of 8,389), and 9,583 households for 2012 (or 80 percent of all households in the final HECS sample). Results of the analyses contained in the report have been adjusted using ABS weights to produce estimates for households in the Australian population as a whole.

The measure of income used in the analyses is current household disposable income. Because time series data are used, the effect of changing household composition on income trends has been removed by the application of equivalence scales. These are also provided by the ABS as part of every survey record for which there is income data.

For the two time periods 1993-94 and 2012 the report documents changes in energy costs both in absolute dollar terms and as percentages of total income and of household expenditure.

Energy costs were defined as the costs for electricity, natural gas and bottled gas. For each relevant variable (e.g. income cohort or household type) energy costs were calculated as the median rather than mean expenditure. Motor fuel costs were defined as including petrol, diesel, and LPG and again expenditure was measured using the median rather than the mean figure. All 1993-94 dollar values were indexed by the Australian CPI to 2012 prices.

This research complements three other studies that have used the same or similar data sources (Richardson and Travers 2002, Chester and Morris 2012, Nance 2013), while expanding on those studies – for instance, by using more recent data, by expanding the time period of analysis, by using a different methodology, or by subjecting the data to a more detailed level of analysis. In some cases this leads to different conclusions in this report from those reached in previous studies.

The study by Chester and Morris (2012) looked at the liberalisation of the Australian electricity industry during the 2000s, and located it within an international comparison. They argue that rising energy costs associated with liberalisation have created a new form of energy poverty. To support their arguments they examined HES data for 2009-10, providing a snapshot of the situation at a point in time rather than a twenty year overview. Their results were presented only with reference to income quintiles, with no consideration of other variables such as tenure type.

The study by Nance et al (2013) is much more detailed, and uses the more recent 2012 HECS data (also analysed for this study) but adopts a different methodology. Their focus is on low income households, which they define as households receiving less than 60 per cent of the median equivalised net household income. The study is also a snap shot in time.

Richardson and Travers (2002) analysed fuel poverty in South Australia (with national figures for Australia as the comparator) using both the 1993-94 and 1998-99 HES data and related their results, mostly limited to income differences, to the UK findings on fuel poverty.

The key arguments of the three research reports are:

- Because of the changes to the structure and performance of the gas and electricity industries, prices have risen;
- Rising energy prices have triggered a big increase in the number of households experiencing energy poverty/hardship; and
- The households experiencing energy hardship are in the lowest income quintiles, including those who are dependent on government income support, and renters.

The major differences between the present study and the others cited above are (1) they are snapshots in time, whereas this report examines data at two different time points, twenty years apart and (2) this study considers a wider range of both explanatory and dependent variables.

There are two research questions addressed by this study:

1. What have been the major changes in the energy expenditure of households over the last two decades, paying particular attention to background variables of income, household type, housing type and tenure.
2. What do these changes imply for the scale and form of energy hardship, or what some call 'fuel poverty', in Australia. This second question seeks to contribute to the growing Australian research and literature on fuel poverty and hardship.

The concept of fuel poverty is a British one, with a lineage tracing back to the 1970s, and was as much concerned with establishing a benchmark for adequacy of heating as with energy costs in the household budget. As a result fuel poverty in the UK has come to be defined as no more than 10 per cent of household income be expended on fuel in order to give a certain standard of thermal comfort (21 degrees in the living room, 18 elsewhere) (DEFRA 2003).

In recognition of major climatic differences between the UK and Australia, the aspect of comfort standards has not really been taken up here, but the focus on costs has. However no standard measure of fuel poverty has been agreed, and different definitions and measures are used in the various Australian research studies on the topic (Richard and Travers 2002, Benvenuti 2012). In some respects 'fuel poverty' is not the appropriate term because it implies a role of fuel or energy costs in pushing people below a poverty line. Most measures are not about that, but rather calculate such things as the proportion that fuel costs account for in the household budget, or quantify in some way an inability to pay bills

on time. Perhaps the more appropriate term is therefore 'energy hardship'. In this study a number of different measures are used to address the research questions, and these measures are explained in the relevant sections.

ENERGY CONSUMPTION: ADAPTIVE BEHAVIOUR

Before looking at temporal changes in energy consumption, and the impact of any changes in consumption on the household budget, some observations can be noted about potential adaptations that households can make in response to rising energy costs – changes that might also be prompted by growing environmental awareness.

Adaptations that can potentially be made by households, in relation to the dwelling and electricity consumption, include:

- Cutting back consumption through better use management
- Purchasing and using more energy efficient appliances
- Home renovation to make it more energy efficient
- Installation of solar energy
- Purchase of a new home built to higher energy standards
- A switch to a dwelling form which has a lower energy cost compared to detached dwellings e.g. town houses and low rise apartments (high rise on the other hand have higher energy use)

The potential changes households can make, in reference to motor vehicle use, are:

- Purchase and use a more fuel efficient vehicle
- Switch to alternative transport modes, e.g. cycling and public transport
- Use motor vehicle less frequently
- Relocate to an environment that requires less motor vehicle usage.

Most of these adaptations cannot be made within a short time frame, as they have costs, in some cases substantial ones, associated with them – for example, house renovations or purchase of a more fuel efficient car. Nevertheless the lengthy period of two decades covered by this study does allow the possibility that some of these adaptations have occurred.

On the other hand, however, households can make different consumption decisions which undermine efforts to reduce energy use and to create a low carbon environment. Some such decisions that have a detrimental impact include the trend over this period toward larger dwellings, more appliance in these dwellings including air conditioners and greater use of motor vehicles. Further research will be needed to show

whether these negatives outweigh the gains that result from positive adaptive behaviours.

If energy prices rise steeply within a very short time, and households become more unable to adapt to the increases, associated energy hardship will be increasingly likely. Over and above hardship at a household level, however, any such budgetary shocks could mean rising political discontent and difficulties for good governance, weakening the ability to implement appropriate policy.

TRENDS IN HOUSEHOLD EXPENDITURE ON ELECTRICITY AND GAS

This section investigates long term trends in the consumption of electricity and gas, and the impact of such consumption on household budgets. An important caveat about the findings reported here is that they relate to the period from 1993-94 to 2012. While this latter date is more recent than that used in some other research studies, the time frame covered by the analyses falls just before the sharp increases in electricity and gas prices that occurred in 2013 and 2014. Only further, later research can throw light on whether the findings of this study will apply in the different energy environment that now prevails. Nevertheless it is clear that some of the conclusions from the analysis are not time bound, and so have contemporary relevance.

What are the long term patterns? Despite considerable publicity and widespread concern about rising energy costs, the evidence from the data suggests a remarkable stability over almost two decades in the way in which energy costs (whether that be the cost of gas or electricity) impact on the household budget .

Trends in expenditure over time

Figure 3 shows gas and electricity expenditure by income quintiles in constant 2012 prices, and reveals that during the last twenty years expenditures increased across all income categories but most rapidly for the highest income quintile. This is due perhaps to a combination of a more rapid increase in incomes amongst high income earners, and their greater consumption of items likely to increase energy use. The median expenditure in 2012 was \$32 per week, up more than 40 per cent on the \$23 per week in 1993-94.

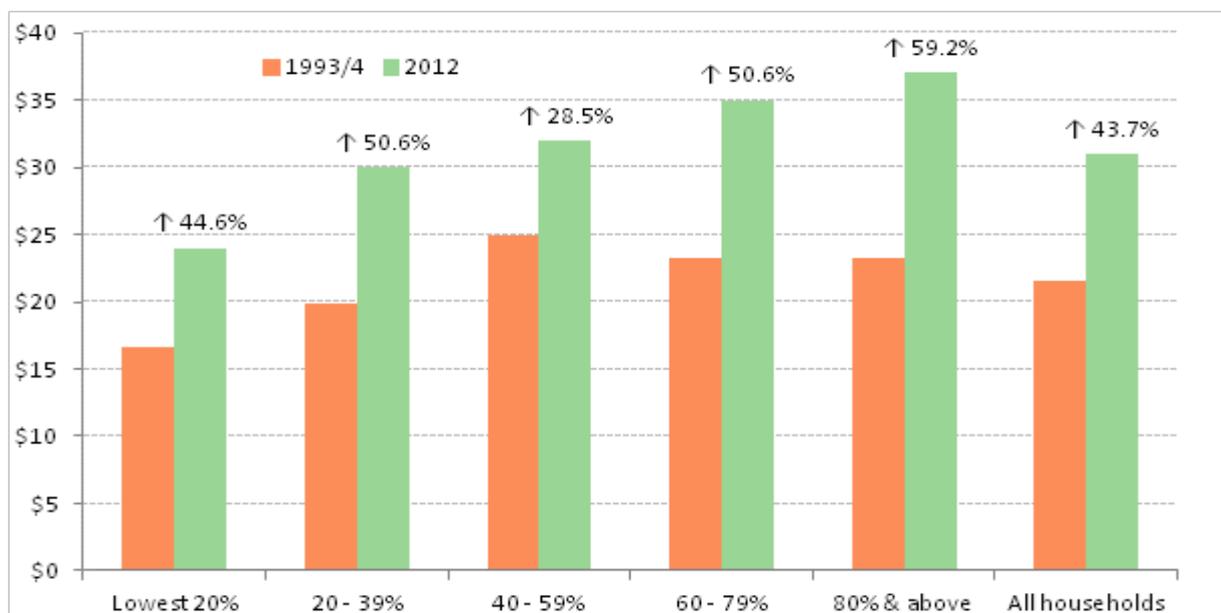


Figure 3: Expenditure on gas and electricity, by income quintiles, Australia, 1993-94 and 2012

Note: Income in constant 2012 dollars.

Source: ABS Household expenditure Survey (HES) 1993-94, ABS Household Energy Consumption Survey (HECS) 2012, CURF. However Figure 4 shows that, as a proportion of household income, gas and electricity expenditure in 2012 was much the same as it was in 1993-94. For all households the median energy cost as a percentage of disposable household income was 2.8 per cent in 1993-94 and 2.7 in 2012, and with not a lot of variation by income quintiles. For example, for the lowest income quintile, the figures were 5.1 per cent in 1993-94 and 5.6 per cent in 2012. Nevertheless it should be noted that this represents an increase between 1993-94 and 2012, whereas for all other income quintiles there was little

change over time. On the surface, this general finding would suggest that the argument by Chester and Roberts (2012) that electricity liberalisation has created greater levels of energy hardship may not be accurate. If there is energy hardship (and section 6 looks at this topic more closely) it is more likely to have been an ongoing issue, not just a product of relatively recent commercialisation changes in the sector. Rather, it may be a function of other enduring processes, such as inadequate household income.

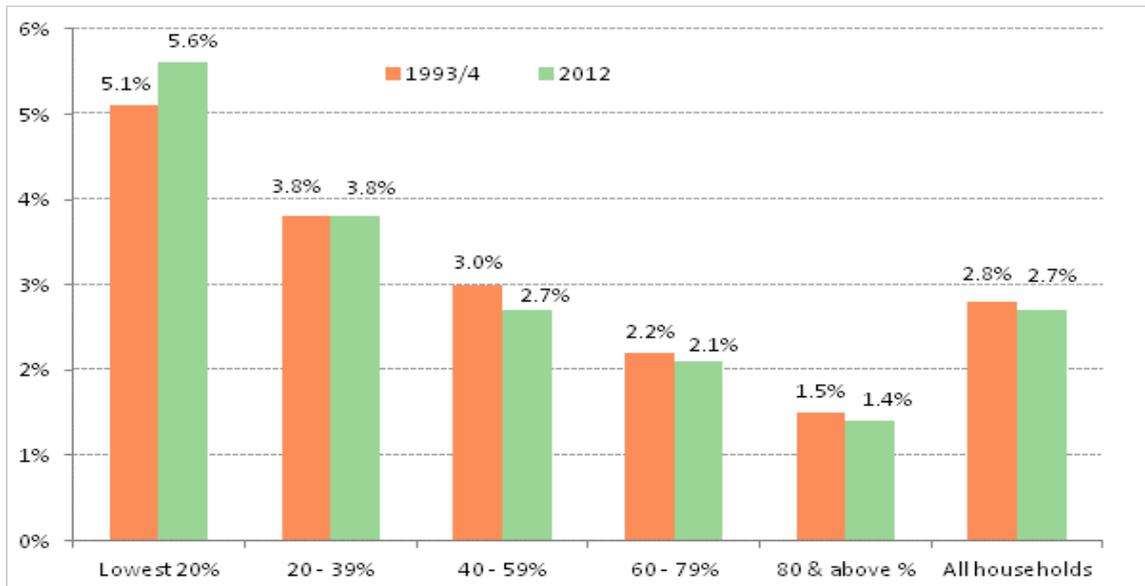


Figure 4: Gas and electricity expenditure as percent of household income, by income quintiles, Australia, 1993-94 and 2012

Source: ABS Household expenditure Survey (HES) 1993-94, ABS Household Energy Consumption Survey (HECS) 2012, CURF. Table 1 details changes between 1993-94 and 2012 in electricity and gas expenditure for a range of key characteristics of households. The only independent variable on which there was marked change over time was for public housing tenure, where expenditure on energy increased from 3.7 per cent of disposable income to 4.8 per cent. (As we shall later see this is consistent with the rise that occurred over this period in the proportion of households in public housing whose energy costs were more than 10 per cent of income.). There are two likely explanations for this increase in this housing sector. The first is that, prior to the 1990s, most multi-unit public housing dwellings (for example, walk up apartments and high rise flats) were not separately metered and households were not billed for energy costs. But progressively, from the 1990s onward, separate metering provision enabled more clients to be billed. A second reason may be that those who were in public housing in 1993-94 comprised a higher income group than those who lived in this sector in 2012. Almost two decades of targeting of public housing to those most in need has resulted in tenants with greatly reduced incomes, for whom utilities assume a much higher proportion of their income (Groenhagen and Burke 2014).

Why, despite substantial price rises for electricity and gas, has the impact on household budgets overall been very limited? The first point is that, for much of the study period, disposable household incomes rose more or less in line with gas and electricity costs, enabling consumers to maintain levels of consumption without having to give up other expenditures. But this is probably not the only explanation. Another is the adaptations households can

make (see section 4) to reduce the impact of gas and electricity price rises.

These adaptations include the purchase of more efficient appliances, the growing take up of solar energy for electricity and hot water, and the improved energy standards required in the construction of many new homes. It would certainly appear that some Australian households have made behavioural adaptations so that, for those householders, rising energy costs have not impacted disproportionately on their household budget.

However the overall stability in the level of gas and electricity expenditure as a proportion of income disguises some variation in the actual distribution of costs. As discussed in more detail in the later section on energy hardship (section 7), households in the two lowest income quintiles experiences much larger increases in the percentages for whom energy expenditure exceeded ten per cent of their income. This suggests these households, for whatever reason, found it harder to adapt their energy budget to either rising costs or consumption needs.

Variation in expenditure on electricity and gas across households

Given the absence of substantial differences in the proportion of income spent on gas and electricity between 1993-94 and 2012, we can focus on the data for 2012 to examine energy costs cross-tabulated with other independent variables (see table in Appendix 1). The broad patterns that emerge are as follows:

Table 1: Gas and electricity expenditure as percent of household income, by selected household characteristics, Australia, 1993-94 and 2012

	1993-94	2012		1993-94	2012
State			Dwelling Type		
New South Wales	2.6	2.8	Separate house	2.9	2.8
Victoria	3.9	3.2	Semi detached	2.8	2.6
Queensland	2.3	2.1	Flat, 1 -2 storeys	3.0	2.8
South Australia	3.1	3.3	Flat, 3 and more storeys	2.2	1.9
Western Australia	2.7	2.4	Other including improvised	3	5.5
Tasmania	3.6	3.6	Total	2.8	2.7
Total	2.8	2.7			
Household type			Tenure		
Single < 65	2.6	2.9	Owned outright	3.3	3.3
Single 65 +	4.1	4.3	Purchasing	2.4	2.3
SINGLE	3.3	3.5	Rent private	2.6	2.6
Couple < 65	2.2	2	Rent Public	3.7	4.8
Couple 65 +	3.4	3.4	Other, including rent free	3.3	3.5
COUPLE	2.7	2.4	Total	2.8	2.7
Couple + 1	2.5	2.3	No. of bedrooms		
Couple + 2	2.6	2.4	No bedrooms/1 bedroom	2.8	2.7
Couple + 3	2.8	2.6	2 bedrooms	3	2.7
Couple + 4	2.9	2.8	3 bedrooms	2.9	2.9
COUPLE W KIDS	2.6	2.5	4 bedrooms	2.6	2.6
Single + 1	3.2	3.6	5 bedrooms or more	2.8	2.7
Single + 2	3.6	3.7	Total	2.8	2.7
Single parent + 3	4.4	4.6			
SINGLE PARENT	3.5	3.7			
Total	2.8	2.7			
Main source of income					
Wage and salary	2.2	2.2			
Own unincorporated business income	2.9	3.1			
Government pensions and allowances	4.3	4.6			
Other income	3.3	2.7			
Total	2.8	2.7			

Source: ABS Household Energy Consumption Survey 2012, CURF

- Energy costs as a proportion of income decline as income increases, with the top income quintile spending only 1.4 per cent of their income on gas and fuel, while the lowest quintile spends 5.5 per cent.
- Singles aged 65 and over and sole parents (particularly those with 3 or more children) committed a higher share of their disposable income to energy than other household types: the figures for these households were 4.3 per cent and 3.7 per cent respectively, compared to the national average of 2.7 per cent.
- The first child in a household raises energy costs by about \$10 per week, with each subsequent child adding another \$5 per week
- The notable category in terms of housing tenure, as previously mentioned, is public housing: gas and electricity costs consumed much more of income for households in this tenure (4.7 per cent) than for all households (2.7 per cent)

- Housing type made little difference in energy costs, with the exception of households in 3 or more storeyed flats who had a much lower cost to income ratio. This appears to result from a combination of higher incomes and lower energy costs, as households in this tenure had a median weekly cost of \$21.
- Households in detached dwellings have higher weekly costs for energy (\$35) than households in other housing types: it was \$25 in semi-detached dwellings and \$21 in flats (irrespective of height). This reflects a relationship to dwelling size and will be discussed in more detail below.
- Of the states, Victoria and Tasmania had relatively higher energy costs (\$36 per week each, compared with the national average of \$31), probably related to climate and associated heating requirements. Queensland, with a warmer climate, was the lowest (\$26 per week).

THE RELATIONSHIP BETWEEN ENERGY COSTS AND DWELLING ATTRIBUTES

The character of the Australian urban form, and the predominant types of dwellings therein, are among the factors that have an influence on household energy consumption (Burke and Ralston (2015)). It might seem self-evident that the large detached house provides a vehicle for greater material consumption, which in turn increases energy requirements. It may be difficult however to disentangle the effects on energy consumption of characteristics of the household (which tend to be larger in a detached dwelling) from the impact of attributes of the dwelling itself.

Figure 5 goes some way toward this by cross classifying household composition with dwelling attributes, particularly dwelling size i.e. whether a detached house or flat, and whether containing one, two, or three or more bedrooms. The chart shows the median energy cost (for gas and electricity) for three household types: a single occupant aged under 65, a childless couple, and a couple with two children. If the dwelling was not an independent variable it could be expected that energy consumption would remain much the same for the same household type, irrespective of size and type of dwelling – for instance, the lifestyle of singles could be similar across dwelling types. However if the dwelling actually

affected lifestyle e.g. encouraged more consumption, then arguably the dwelling has an independent effect.

Figure 5 suggests that the nature of the dwelling does have some independent effect on energy costs. In the case of all three household types, the amount spent on energy rises as the dwelling becomes larger, more so for couples and couples with children than for singles. For example, for couples in a detached house the median cost of electricity and gas rises from \$22 per week in a one bedroom dwelling to \$36 per week in one with four bedrooms. For couples with (the same number of) children energy costs rise from \$38 to \$52 per week according to the size of the dwelling.

What are the factors behind the apparent association between energy costs and dwelling size shown up by Figure 5? Possible explanations include (a) heating and cooling, particularly the take up in recent decades of central systems where the whole dwelling is heated or cooled, even if only one room is actually being used; (b) more rooms enable more appliances e.g. computers and TVs, and, particularly in multi person households, their simultaneous use; and (c) leaving lights on in multiple rooms is a common practice for many households, and fewer rooms mean less use of lighting.

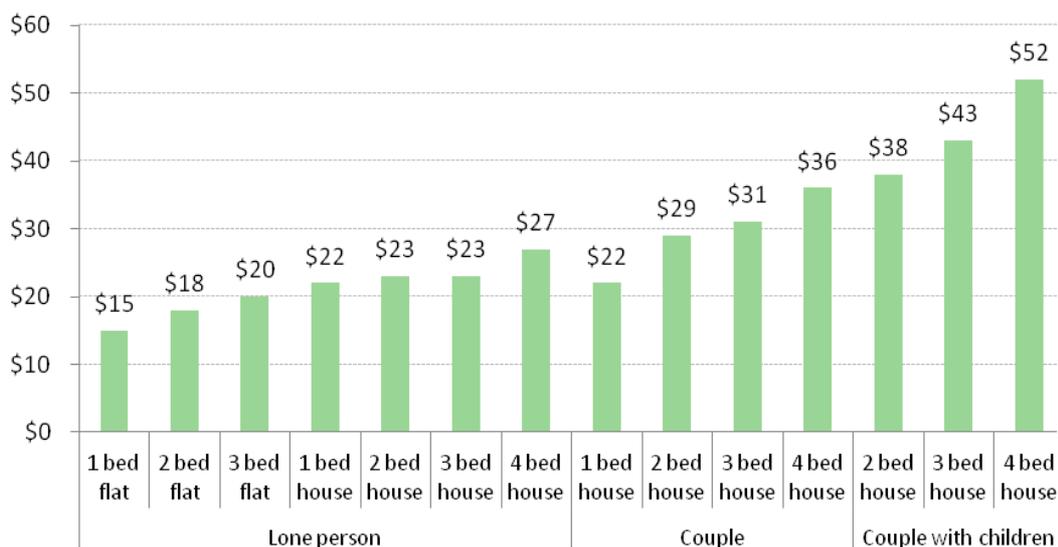


Figure 5: Household gas and electricity expenditure by dwelling type and size, Australia, 2012

Source: ABS Household Energy Consumption Survey 2012, CURF

ENERGY HARDSHIP

The two previous sections of this report have documented change over time in energy expenditures in relationship to household income, but made no assessment as to whether these expenditures were problematic, i.e. did they mean hardship for any households?

Energy hardship can be defined by a constructed normative measure, for instance the per cent of income committed to energy costs, with 10 or more per cent nominated as a benchmark of hardship. A benchmark measure typically has some historical reason for its choice. As discussed in section 3, the 10 per cent benchmark comes from a policy transfer process whereby a UK derived benchmark was adopted here. This study will investigate whether the 10 per cent benchmark is a robust measure of hardship for Australian households.

Alternatively, hardship can be an expressed measure: that is, what households say is their actual behaviour. The ABS HES financial stress indicators, included in the HES since 2003-04, provide the means to analyse an expressed measure of hardship caused by energy costs. The survey asks six questions around personal wellbeing, such as whether the household could afford a holiday at least once a year, and several questions about financial wellbeing, referenced to the previous twelve months, including the ability to pay utility bills, whether assistance with bills was sought from energy companies, and whether the householder was unable to heat or cool their home.

This section looks at the issue of energy hardship in more detail, using these two different types of measures of hardship. The first is the benchmark measure of 10 per cent or more of income committed to energy (gas

and electricity) costs. The other measure is based on the set of energy-related self-reported indicators of financial stress, focusing on the stated inability to pay gas and electricity bills on time. (Other indicators, including whether a household was able to heat or cool their home; whether they sought assistance from an electricity or gas company to pay bills; and whether the household received a disconnection warning notice are also mentioned).

In this report a number of key socio-economic variables are analysed, both to assess which households are most affected as well as what factors might explain such hardship.

Table 2 contains the broad numbers of households that meet the definition of hardship on each indicator. These results were derived after restricting the analysis to low income households (defined as those in the lowest 40 per cent of income), on the assumption that any energy related hardship problems for higher income earners result from lifestyle choices.

The greatest number expressing hardship (475 301 households) were those who self-reported an inability to pay utility bills on time. However this can be separated into those for whom this occurred 'once or sometimes' in the previous twelve months, and those who encountered this difficulty 'often or always', with the latter arguably being indicative of an ongoing problem and therefore a particularly robust measure of hardship. There were almost 175,000 households (comprising 6.7 per cent of all lower income households) in this second category. This compares with 241,222 households (9.2 per cent) who sought assistance with their bills from an energy provider and 158,653 households (5.8 per cent) who received a disconnection warning notice. More than 146,675 of all households (or 5.6 per cent) said that they could not afford to heat or cool their dwelling.

Table 2: Measures of energy hardship among low income households, Australia, 2012

Energy hardship measure	Low income households	
	Number	Per cent
Energy costs greater than 10 per cent of household income	292,000	10.9
Stated inability to pay bills on time	457,301	17.5
Once or sometimes	282,348	10.8
Often or always	174,954	6.7
Sought assistance with bills from an energy company	241,222	9.2
Received a disconnection warning notice	158,653	5.8
Could not heat or cool dwelling	146,675	5.6

Source: ABS Household Energy Consumption Survey 2012, CURF.

Putting all the threads together it would seem that somewhere between 150,000 and 250,000 lower income households Australia-wide appear to have a sustained problem in dealing with energy costs while some 450,000 experience hardship at some time.

One major problem in assessing so called energy hardship concerns the issue of causation. Most of the literature on the topic attributes energy poverty to the cost of energy, or more accurately the rising costs of energy. But is difficulty in paying energy costs a function of the energy costs themselves, or is it due to (a) household incomes that are too low; (b) other budgetary expenditures e.g. housing costs, that have increased to the extent that they are crowding out expenditure on energy; (c) poor financial management, given that some but not all low income households have trouble paying their utility costs; or (d) a combination of all of these factors. In this study we attempt to make some judgements about this question, notably in respect of the impact of housing costs.

The 10 per cent of income hardship measure

As already noted, this commonly used measure in Australia largely derives from an adaptation of the British concept of fuel poverty. However there is no clear rationale for the arbitrary choice of 10 per cent as the benchmark, and in fact it does not bear a close

relationship with the other measures of hardship. Nevertheless the data are presented here, in anticipation that it may reveal some patterns which, reinforced by other data, could be suggestive of problems and policy directions.

While section 5 documented an overall stability across two decades in gas and electricity expenditure as a proportion of income more detailed analysis reveals that this disguises significant variation in the actual distribution of costs.

As shown in Figure 6 the two lowest income quintiles had much larger increases in the percentages of households in energy hardship than other income groups. In 1993-94, 11.7 per cent of the lowest income quintile had energy costs in excess of 10 per cent of their income, but this jumped to 18.5 per cent in 2012. And for the second lowest quintile, the proportion in energy hardship also rose, although by a much smaller margin, from 3.4 per cent to 4.5 per cent. This suggests these households, for whatever reason, found it harder to adapt their energy budget to either rising costs or consumption needs. It provides some support for the argument that lower income households are now confronting growing energy hardship (Chester and Morris 2012).

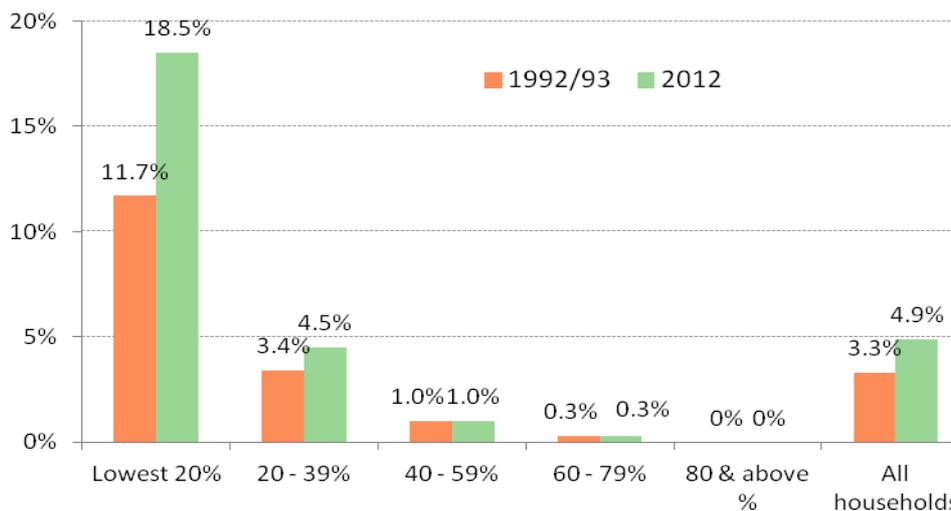


Figure 6: Expenditure on gas and electricity greater than 10% of household income, by income quintiles, Australia, 1993-94 and 2012

Source ABS Household Expenditure Survey Unit record file 1993-94, Household Energy Consumption Survey 2012 CURF

Among the explanations for the deteriorating position of low income households could be that for many (particularly those on Centrelink payments), incomes have not kept pace with energy costs to the same degree as has been the case for other households; that

they have been unable to adapt their dwellings to a higher cost energy environment (many will be renters); that they have higher housing costs (again related to being renters); and that they have older, less energy efficient appliances. In aggregate, of all 275,098

households estimated as having a gas and electricity '10 per cent of income hardship problem', 224,672 or 85.1 per cent were in the lowest income quintile.

Table 3 provides more detail about the 10 per cent benchmark. The key patterns are:

- Queensland has much fewer households in hardship (2.8 per cent in 2012) compared to Victoria or Tasmania (7.2 per cent and 7.3 per cent respectively), reflecting climatic differences and lower heating costs.

- Singles and single parents have a higher rate of energy hardship, with single parents of 3 or more children particularly badly hit (14.9 per cent in 2012).
- Hardship is related to dwelling type, with a higher percentage of households in detached houses being in energy hardship than other dwelling types; but separating out whether this is an income effect (many pensioners on low incomes live in detached housing) is difficult.

Table 3: Percentages of low income households with expenditure on gas and electricity more than 10% of household income, by selected characteristics, 1993-94 and 2012

	1993-94	2012		1993-94	2012
State			Dwelling Type		
New South Wales	2.2%	4.7%	Separate house	3.3%	5.2%
Victoria	6.7%	7.2%	Semi detached	2.4%	4.9%
Queensland	0.7%	2.8%	Flat 1 -2 stories	4.5%	3.5%
South Australia	3.1%	5.7%	Flat 3 and above stories	1.4%	1.5%
Western Australia	3.0%	2.9%	Other including improvised	2.4%	0.0%
Tasmania	4.3%	7.3%	Total	3.3%	4.8%
Household type			Tenure		
Single < 65	4.6%	7.5%	Owned outright	4.8%	6.0%
Single 65 +	5.6%	7.5%	Purchasing	1.5%	2.9%
SINGLE	5.0%	7.5%	Rent private	2.7%	4.6%
Couple < 65	1.7%	2.9%	Rent Public	3.6%	11.8%
Couple 65 +	3.9%	4.6%	Other inc rent free	2.6%	8.4%
COUPLE	2.5%	3.4%	Total	3.3%	4.8%
Couple + 1	2.0%	3.6%	No. of bedrooms		
Couple + 2	2.1%	2.8%	No bedrooms/1 bedroom	3.1%	4.3%
Couple + 3	1.4%	3.4%	2 bedrooms	3.5%	4.6%
Couple + 4	3.8%	4.2%	3 bedrooms	2.9%	4.8%
COUPLE W KIDS	2.1%	3.2%	4 bedrooms	3.9%	4.8%
Single + 1	5.3%	6.6%	5 bedrooms or more	5.5%	8.5%
Single + 2	2.7%	6.7%	Total	3.3%	4.8%
Single + 3	15.1%	14.9%	Dependent children		
SOLE PARENT	5.3%	7.8%	No dependent	3.5%	5.4%
Total	3.3%	4.8%	At least 1 dept child at home	2.9%	4.0%
Main source of income			Total	3.3%	4.8%
Wage and salary	0.9%	1.8%			
Own unincorporated business income	4.8%	6.7%			
Gov't pensions & allowances	6.5%	10.8%			
Other income	4.3%	5.5%			
Total	3.3%	4.8%			

Source ABS Household Expenditure Survey 1993-94, Income and Housing Survey (Household energy consumption 2012) Unit record files

- Households in public housing are more likely to be in energy hardship, 11.8 per cent in 2012, and this has increased markedly since 1993-94. As discussed earlier this is probably related both to the greater targeting of tenants over this time period and the move to separate billing of multi-unit dwellings.
- Those on government pensions and allowances had much higher rates of hardship (10.8 per cent in 2012, rising from 6.3 per cent in 1993-94) than those with other sources of income.

Perhaps the most interesting finding for the 10 per cent benchmark comes when it is cross tabulated with other measures of energy hardship. It could be reasonably expected that if households had excessive levels of expenditure relative to income this would manifest itself in expressed problems, such as inability to pay bills, or having to seek assistance from an energy company. However, in 2012, only 16 per cent of those who reported that they were unable to pay utility bills, and 18.2 per cent of those who sought assistance spent more than 10 per cent of their household income on electricity and gas. Many households paying less than 10 per cent of their income are clearly experiencing budget stress. The problem with the 10 per cent measure is that it tells us nothing of the other expenditure areas in the household budget. One reason why a household might spend more than 10 per cent of its income on electricity and gas could be that expenditures are low in other areas, and hence there is budgetary capacity to pay bills. On the other hand a household that is spending perhaps only 5 per cent on electricity and gas may have other costs, such as high housing and/or transport costs, or credit card debt. The crowding out budgetary effects of these costs may restrict the capacity to pay utility bills. All this suggests that the 10 per cent benchmark may be of limited value as a measure of energy hardship in the Australian context.

Stated hardship: inability to pay bills

Instead of using household expenditure data to ascertain the extent of energy hardship, an alternative method is to consider the self-reported views of householders concerning their financial situation. A number of questions about financial wellbeing included in the HES and in HECS provide the means of examining changes in levels of energy hardship over time, although the relevant comparable questions in the HES only go back to 2003-04. These questions refer to (1) the inability to pay gas, electricity or telephone bills on time in the last twelve months due to a shortage of money, (2) whether the householder actually sought assistance from a utility

provider to pay bills (3) whether householders could heat or cool their dwelling and (4) whether they received a disconnection warning notice from a provider.

There are two aspects to the question about stated inability to pay bills on time: whether or not this had happened within the reference period, and if so, the frequency with which it had occurred (once, sometimes, often, or always). As the sample size for the first part of the question was much larger than for the question about frequency, it was used for the analyses because it was statistically more robust although slightly weaker in how well it measure hardship. However several qualifications must be borne in mind when interpreting the results. Firstly, telephone bills are included, together with gas and electricity. Telephone costs, largely related to new technology (mobile phones and data downloads), have increased greatly. Thus it is difficult to know whether hardship identified via this question is due to energy costs or to telephone costs and therefore whether the degree of 'energy' hardship is exaggerated. Secondly the question asks about ability to pay *on time*, which is different from inability to pay at all. Thirdly it states that the payment problem is due to shortage of money. The latter point raises the question of whether an inability to pay utility bills is due to the high cost of those utilities or to other factors which account for a shortage of money, such as either or both low income or housing affordability problems.

Putting aside these qualifications, Table 4 lists, for 2003-04 and for 2012, the numbers and percentages of households who reported that they were unable to pay utility bills, for two categories of households, based on income – those earning the lowest 40 per cent of income, and the remaining households in the relatively higher income group. . Two features stand out. First, the level of hardship measured by inability to pay bills was lower for both income groups in 2012 than in 2003-04 (for low income households, dropping from 20.6 per cent to 17.5 per cent). Second, the absolute numbers of households classified as in hardship due to inability to pay bills was greater for the more affluent households (more than 732, 000) than for lower income households (nearly 460,000).

This is a very different distribution of hardship to that identified by the '10 per cent rule of income on energy costs' benchmark, which has hardship concentrated among lower income earners. However it is unlikely that higher income earners experience hardship due to the lack of resources to pay bills; for them it would appear to be a lifestyle choice, perhaps related, as we shall see in the next section, to housing affordability.

Table 4 shows the percentages unable to pay utility bills between 2003-04 (no equivalent data exists before this period) and 2012. The data provides no evidence of a worsening problem suggesting arguments that higher energy costs over the last decade have increased energy poverty may be overdone.

Table 4: Households unable to pay utility bills, by broad income category, 2003-4 and 2012

	2003-4 HES		2012 HECS	
	Count	%	Count	%
Lowest 40% of income households	533,484	20.6%	457,301	17.5%
All other households	619,188	12.9%	732,318	11.9%

Source ABS Household Expenditure Survey 2003-04, Household Energy Consumption Survey 2012, CURF.

Figure 7 charts, the percentages of households that in 2012 reported they could not pay utility bills, separately by income quintiles. A major point is the large proportion

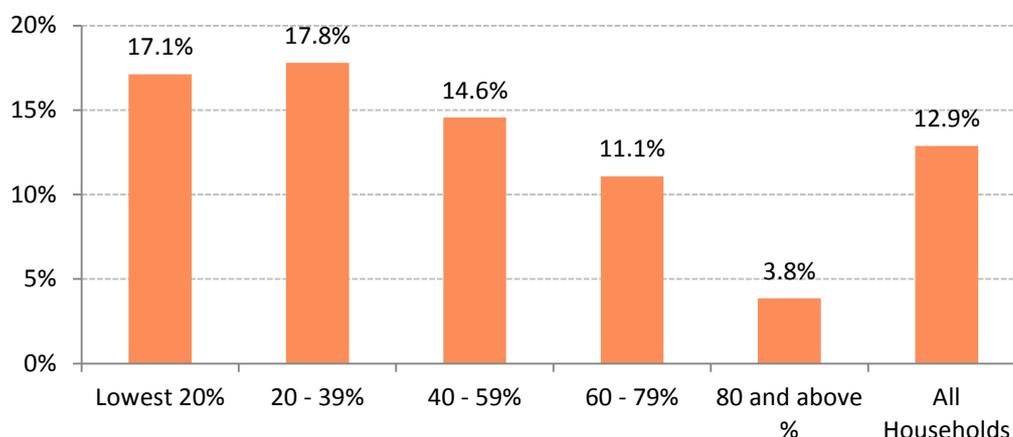


Figure 7: Percentages of households who could not pay bills on time, by income quintiles, Australia, 2012

Source ABS Income and Housing Survey (Household energy consumption 2012) Unit record files

Some observations that can be made from Table 5 are:

- The private rental sector is problematic in that many tenants report experiencing financial stress. Among all households who indicated they were unable to pay bills, 44.3 per cent were renting privately, and this proportion was a little higher, 46.6 per cent, for low income earners. Around 30 per cent of all private dwellings in Australia are owned outright; just 4.9 per cent of all households having problems paying bills owned their dwelling, while for low income households it was a little higher, 7.5 per cent. This contrast between tenants and home owners illustrate the importance of tenure and housing costs in affecting ability to pay utility bills. The interaction

of all households (12.9 per cent) in this situation, not just lower income households.. It was not the lowest, but the second lowest income quintile which had the highest proportion (17.8 per cent) saying this.. Higher income groups accounted for almost half of those households stating they were unable to pay bills, suggesting this is more than just a problem of utility costs in relation to income. As explored in more detail later it would appear to be related to housing costs.

On the assumption that, for higher income households, inability to pay bills is likely to be the result of personal lifestyle choices, further more detailed analysis of the issue of who reported an inability to pay bills focuses on low income earners – defined here as households in the lowest forty per cent of income. Table 5 records the differences, on key variables, between these low income households and all households who had difficulty in paying their utility bills. Other household characteristics, such as dwelling type and number of bedrooms reported in previous sections have been excluded from this table as no variations of interest or relevance were discerned.

between low income and housing costs is clearly an important driver of energy hardship.

- Singles are also over-represented in their inability to pay bills, accounting for 31 per cent of all such households, and even more, 36.5 per cent of the lowest income group.. Significantly, given that much of the fuel poverty literature focuses on the problems of pensioners, it was older households (either singles or couples aged over 65) which comprised the smallest proportions of those who said they were unable to pay bills (respectively, 4.6 per cent and 1.7 per cent of all households unable to pay utility bills). This may be because most in these groups (namely those on a pension) are eligible for concessions, or perhaps they are just better at budgeting. But the

more likely explanation is related to housing costs - most aged over 65 will not have a mortgage or pay rent.

- Couples with children tend to be more likely to have financial difficulty: these households, however, make up a higher proportion of all households that have

difficulty paying bills (35.5 per cent) than they do among lower income households (30 per cent). Among the latter, family size tends to have some influence, in that there are slightly higher percentages of couples with two or three children who are unable to pay their bills.

Table 5: Households unable to pay utility bills, low income and all households, by selected characteristics, Australia, 2012

	Households in lowest 40% of income unable to pay bills		All households unable to pay bills	
	Count	Col %	Count	Col %
Household type				
Single < 65	130,526	28.5	223,167	26.4
Single 65 +	36,259	7.9	39,159	4.6
<i>Single</i>	166,784	36.5	262,326	31.0
Couple < 65	39,745	8.7	120,393	14.2
Couple 65 +	13,272	2.9	15,143	1.7
<i>Couples</i>	53,017	11.6	135,536	16.0
Couple + 1	35,177	7.7	87,422	10.3
Couple + 2	43,104	9.4	108,246	12.8
Couple + 3	43,210	9.4	74,865	8.7
Couple + 4	15,541	3.4	29,483	3.5
<i>Couples with kids</i>	137,033	30.0	300,015	35.5
Single parent+ 1	34,676	7.6	57,600	6.8
Single parent+ 2	43,890	9.6	59,720	7.1
Single parent + 3	21,902	4.8	28,394	3.3
<i>Sole parent</i>	100,467	22.0	145,713	17.2
Total	457,301	100.0	843,590	100
State				
New South Wales	165,520	36.2	285,790	33.9
Victoria	106,970	23.4	202,542	21.7
Queensland	99,894	21.8	183,829	21.8
South Australia	36,659	8.0	62,617	7.4
Western Australia	26,428	5.8	72,271	8.5
Tasmania	12,990	2.8	20,000	2.3
Total	457,301	100.0	843,590	100
Tenure				
Owned outright	34,251	7.5	41,928	4.9
Purchasing	99,545	21.8	297,588	35.3
Rent private	213,096	46.6	373,848	44.3
Rent Public	79,923	17.5	87,024	10.4
Other inc rent free	30,486	6.7	43,202	5.1
Total	457,301	100.0	843,590	100

Source: ABS Income and Housing Survey (Household energy consumption 2012) Unit record files

Table 6 presents some results of analysis to explore the reasons why households may be unable to pay their utility bills.. Data are provided for two income categories - the lowest 40 per cent and the lowest 20 per cent of household incomes.

Table 6: Low income households unable to pay utility bills, key characteristics, by two income categories, Australia, 2012

	Lowest 40% income		Lowest 20%	
	n	%	n	%
Spent more than 10% of income on Gas and electricity	74,063	16.2%	53,758	23.9%
Spent more than 10% of income on car fuel	90,046	19.7%	51,996	23.2%
Spent more than 20% of income on HH & car fuel	71,117	15.6%	50,710	22.7%
Not employed (inc outside labour force)	261,178	57.1%	188,268	83.9%
Govt payment as main source of income	281,779	61.6%	199,083	88.7%
Spent more than 30% of income on housing	250,334	54.8%	130,093	57.9%
Aged 65 and over and on pension	48,186	10.5%	36,027	16.0%
Aged under 65 and on a pension	233,593	57.4%	163,056	86.9%
Has debt	132,929	29.1%	47,093	21.0%
Dwelling not insulated	209,760	45.9%	110,994	49.4%
Has a pre-school aged child	120,996	51.0%	42,524	47.3%

Source ABS Income and Housing Survey (Household energy consumption 2012) Unit record files

The main findings from Table 6 concerning low income households facing difficulties in paying utility bills are:

- A disproportionate number have government pensions as their main sources of income (61.6 per cent of those in the lowest 40 per cent of income earners, and 88.7 per cent for the lowest 20 per cent). Related to that, 57.1 per cent and 83.9 per cent respectively are not employed. The obvious explanation here is that income support for many households is not enough to pay their bills, including energy bills. But there is also more complexity.. The bulk of those unable to pay bills and on a pension were aged under 65; aged pensioners appear more able to cope financially compared with those under 65. . Why this is the case may be partly attributable to the differences in payments and indexing over time for the aged pension versus Newstart, widow, sickness, partner and parenting payments. It is perhaps more likely to be linked to the fact that a higher proportion of those aged under 65 still have to make housing payments, whereas the bulk of those 65 or older are outright owners (Burke, Stone and Ralston 2014 Table 8). Overlaying the problem of inadequate income support is the fact that people who are not in the workforce - whether unemployed, or out of the workforce because of their age, caring responsibilities, or disability, are at home much more. This means, all other factors constant, that more energy will be used for heating, cooling, lighting and entertainment. In short they have a constrained lifestyle which tends to dictate higher energy consumption.
- A majority of those with an inability to pay bills have a housing affordability problem (54.8 per cent), the latter measured by the fact that rents or mortgages consume more than 30 per cent of household income (see section 7.3 for more detail). Given that, generally, the scale of weekly housing costs greatly exceeds gas and electricity costs in the household budget it is not difficult to argue that the majority of people expressing problems in paying utility bills do so because of housing costs, not utility costs.
- A relatively small percentage who said they were unable to pay utility bills actually had high fuel bills, as defined by the 10 per cent or more of income measure: only 16.2 per cent of the lowest 40 per cent income group, and 23.9 per cent for the lowest 20 per cent of incomes. This also suggests that the more important factors are income and housing costs.
- Debt other than a mortgage was more significant than fuel costs, although still not as important as other factors. Of those unable to pay bills, 29.1 per cent of the households in the lowest 40 per cent of income q had other debt, but this proportion actually fell to 21 per cent for the lowest income quintile. This may imply that most of the lowest income households were managing their budgets as best they could, and were not resorting to debt as a budgetary resort, although on the other hand a sizeable minority appear to be doing that.
- Another interesting finding is the impact of having a pre-school aged child (51 per cent of low income households reporting they were unable to pay bills)),

highlighting the financial stresses a child can put on the budget of such households.

Housing affordability and energy hardship.

Discussion in the previous section drew attention to the potential role of housing affordability in explaining an inability to pay utility bills. To examine the effect of housing affordability on the household budget, affordability can be measured by the 30/40 benchmark. This is a standard Australian housing affordability measure, and refers to the proportion of households, among the lowest 40 per cent of income earners, who spend more than 30 per cent of their income on housing costs (Yates and Gabriel 2006). The measure is based on the assumption that the affordability circumstance of households in the higher income quintiles is not relevant; only the households in the lowest 40 per cent of income that are paying more than 30 per cent of their income on housing have an affordability problem. If higher income earners have an affordability problem, that is their choice! Housing costs in this measure refer only to mortgages and rents, and do not include insurance, body corporate fees or maintenance costs.

Figure 8 underlines the importance of housing affordability in a household's inability to pay utility bills. This shows how the percentage unable to pay bills increases with the scale of the affordability problem, both for home purchasers and private renters. Looking first at purchasers we can see how this percentage increases as mortgages take a larger percentage of income. Those with mortgages under 10 per cent of income account for only 11.2 per cent of those unable to pay bills, but this

rises to 29.4 per cent for those with mortgages in the range 20-29 per cent of income, and to 23.8 per cent for those in the 30-39 per cent range. Overall, purchasers with mortgage payments in excess of 30 per cent of their income accounted for 42.9 per cent of those with an inability to pay their bills.

The problem is much worse for renters. By paying off their mortgage, home purchasers can control their affordability position and ultimately reduce it to zero. Renters are, however, complete price takers and have no control over costs. Thus only a small proportion of renters who have difficulty paying utility bills have rents less than 20 per cent of their income. As affordability worsens for tenants, so do the proportions who cannot pay bills. Renters who exceed the 30 per cent housing affordability benchmark account for 63 per cent of those with an inability to pay their bills.

Interestingly the biggest jump in the rate of inability to pay utility bills for both tenure groups was between the 20 and 30 per cent housing affordability benchmark, suggesting that the historical affordability benchmark of 25 per cent, now largely displaced by 30 per cent, was a sound measure of when problems set in if housing costs go too high.

Housing costs are the largest call on the budget for most households (except for outright owners), and if these costs are too high they are likely to crowd out other budget items. In short, energy hardship related to gas and electricity costs, as measured by householders' expressed inability to pay utility bills, seems to have as much to do with housing costs as with actual problems around energy costs.

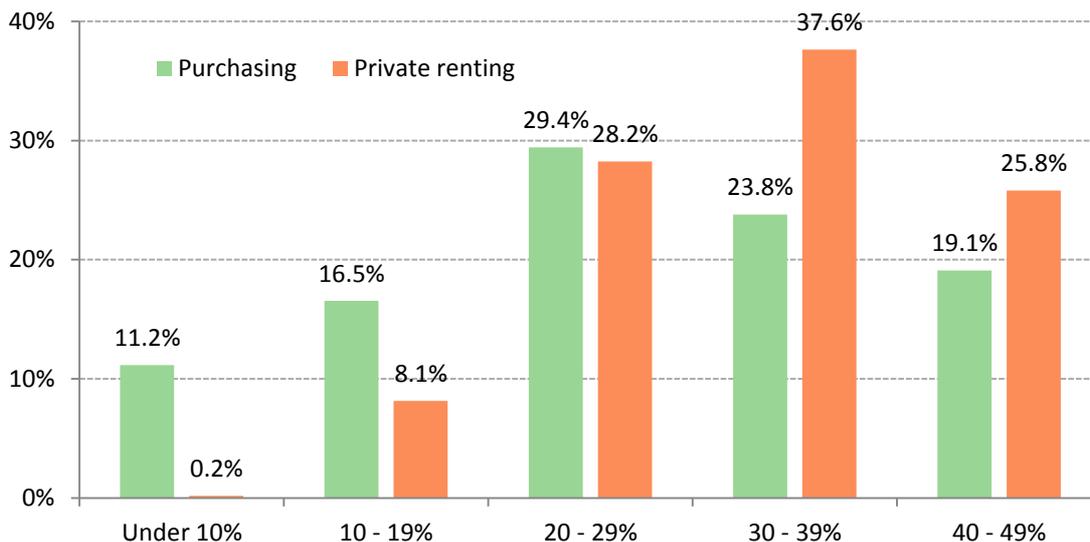


Figure 8: Percentage of households unable to pay utility bills, by categories of housing affordability, Australia, 2012

Source ABS Income and Housing Survey (Household energy consumption 2012) Unit record files

Energy hardship: conclusions and policy implications

The results from the preceding analyses in some cases reinforce findings from other research in the area, but sometimes indicate a different story.

Firstly, the evidence suggests that, overall, the level of energy hardship as it relates to the costs of gas and electricity did not increase in the two decades to 2012. This would appear in part to be a function of (a) the fact that household incomes kept pace with the increases in gas and electricity prices and (b) some adaptive behaviour by households. It would also suggest that the progressive liberalisation of the gas and electricity industries have not been major factors in shaping hardship - at least until 2012 when the data analysed in this study ends. However this generalisation does not mean there is no hardship at all, because there are households experiencing energy hardship. According to these data the problem has not got worse over the time period of the study, but rather there is an enduring and continuous problem of hardship.

Secondly, the analyses suggest that the 10 per cent benchmark for electricity and gas expenditure as a percentage of household income was not a robust measure of hardship, instead the measure based on expressed inability to pay utility bills' was a more sound indicator of hardship, capturing the stated behaviours of households.

A third result to note is that while energy hardship across all households did not increase, it did so for those on lower incomes, a finding consistent with other research. The reasons may be that incomes for this group of households did not increase as rapidly as for others, and/or their ability to adapt to rising energy costs was more circumscribed.

Fourthly, a major cause of the latter is likely to be the disproportionate numbers of low income earners in the private rental sector, where tenants have limited ability to control the costs of their housing, i.e. the rent, or the environmental performance of the property e.g. insulation, quality of heating and cooling appliances.

A fifth point is that a disproportionate number of low income households categorised as being in energy hardship were receiving government pensions and benefits, excluding the old age pension. In fact, in this respect the former were worse off than old age pensioners!

Sixth, housing affordability is a major factor related to energy hardship: the majority of households classified as being in energy hardship were also households categorised in excess of the standard Australian housing

affordability benchmark. Moreover, while the focus of the analysis was on the lowest 40 per cent of income earners, a substantial minority of all households expressing difficulties in paying bills also had the problem of housing affordability. The scale and durability of affordability problems for many Australian households (rents cannot be controlled or mortgages paid off quickly), suggest a systemic issue which may constrain government efforts to implement low carbon initiatives that might have a positive impact on household budgets.

And finally, a minority of those experiencing difficulty paying utility bills had multiple financial problems, including non-housing debt, indicating that a lack of skills in financial management could be reinforcing other more structural factors such as low income.

Together, these findings suggest that the typical policy response to energy costs of offering concessions, may be too limited. Other policy initiatives need to be explored, including the following.

- Some form of incentive (grants/ tax provisions) for landlords to upgrade the energy rating of rental properties. One budget-neutral way this could be done is through restructuring existing rental subsidies, such as negative gearing or capital gains tax provisions, in a way that the maximum claim is only available for rental properties achieving some minimum energy performance standard, e.g. provision of insulation, high energy rating hot water services, heating and cooking appliances.
- Providing potential renters or purchasers with information to improve decision making. These could include the provision of mandatory energy performance certificates (EPC) as in the United Kingdom, which contain information about a property's energy use and typical energy costs, and recommendations about how to reduce energy use and save money.
- Extending concessions to low income families who are renting but are not eligible for concessions under current concession holder provisions, and modifying family concessions in such a way as to recognise the number of children.
- Requiring or recommending that in working out mortgage eligibility, financial institutions use some form of minimum budget standard for households which factors in utility costs (including energy costs) as well as loan costs.
- Providing better instruments/information processes for gas and electricity consumers to find out the best prices being offered by distributors. The current methods are opaque and clunky, and it is likely that the most skilled and informed at accessing such

information are higher income earners, not those experiencing fuel hardship.

More generally, the importance of housing affordability problems raises the issue of whether the combination of low incomes and high house prices and rents will create, for many households, a continuing reality of energy hardship. This may occur almost irrespective of whether gas and electricity prices increase, remain stable, or fall. Rent or mortgage payments have first call on the household budget, and if this does not leave enough for other payments there will inevitably be difficulties in paying gas and electricity bills. Without wishing to divert attention away from gas and electricity providers, in many cases they appear to be taking the flak for a problem that has deeper, more structural origins. The solutions are more affordable housing, and reform of income support, but these take us into a policy domain well beyond the remit of this report.

TRENDS IN HOUSEHOLD EXPENDITURE ON PETROL

Attention now turns to household consumption of motor vehicle fuel (petrol, diesel and LPG). In analysing data on the expenditure and distributional issues associated with motor vehicle fuel, a problem is that a minority of households do not actually report expenditure on fuel, either because they do not have a motor vehicle or because someone else (e.g. an employer) is paying for the fuel. For the purpose of analysis in this report, all households that reported no expenditure were excluded.

Trends in expenditure over time

Figure 9 displays expenditure on fuel by income quintile and reveals that in constant 2012 dollars the 2012

median weekly expenditure of \$50 was 35 per cent higher than the \$36 of 1993-94. There are however some interesting distributional differences compared to equivalent data for gas and electricity (Figure 3). In the case of the latter, expenditure increases were broadly spread across the income quintiles although somewhat higher for the highest quintiles. In Figure 9 however the change is more marked at the higher end of the income spectrum, with the lowest income quintile showing only a small increase of 3.3 per cent compared to the 5th quintile of 56.2 per cent. It appears that higher income has translated into greater expenditure on motor fuel than happened for electricity or gas. This indicates that there may be greater income elasticity of higher income households for the products that consume motor fuel, i.e. cars, than for the appliances that consume electricity or gas.



Figure 9: Expenditure on motor fuel by income quintiles, Australia, 1993-94 and 2012

Source ABS Household expenditure Survey (HES) 1993-94, Income and Housing survey (household consumption file) 2012

However in some respects the fuel expenditure data charted in Figure 9 only takes on real meaning when related to the household income for each cohort, as for most of the study period household disposable income increased at much the same rate as that of motor fuel price although the latter was much more unstable. Thus Figure 10 shows the percentage of household income expended on motor fuel for each quintile and reveals that the amount committed to motor fuel has *fallen* over the twenty years. In 2012 the percentage of the household budget going to motor fuel was 4.3 per cent of the total, down from 4.5 per cent nearly twenty years earlier. The lowest income quintile, as occurred with gas

and electricity, proportionately pays the most (6.9 per cent of income in 2012), but this quintile also experienced the largest decrease over the years. Over time, a small increase in expenditure combined with a larger increase in income produces a decline in budgetary impact. However these falls do not appear to be explained solely by income increases as there is some evidence of a range of adaptive behaviours towards a lower carbon environment.

Adaptive behaviours can be seen in different types of evidence. Firstly, Australian consumers have been purchasing smaller and more fuel efficient vehicles to the extent that the large, less efficient cars of the type

previously built in Australia, i.e. Holdens, Fords, Toyotas, and Mitsubishi's, were by 2012 either extinct (Mitsubishi) or on the path to it (the other three). The top selling cars in Australia now are smaller, thus helping to reduce the average rate of fuel consumption for passenger vehicles from 11.5 litres per 100 kilometres in 1993 to 11.1 litres in 2012 (ABS 1996 p14, 2013 p10). The decrease may have been much greater but for a trend that is contrary to low carbon consumption in the form of the growing purchase of light commercial vehicles (largely utes) for

household use. But even for these vehicles fuel consumption has fallen from 13.2 l/100k to 12.6 l/100k (ABS 1996 p14, 2013 p10). The latter consumption trend is in some respects a metaphor for the challenges in transitioning to a lower carbon society. The take up of utilities for household rather than business use is driven less by any functional requirement than by themes of fashion, status, and marketing. Consumption prompted by such factors may often run counter to an environmentally sustainable society.

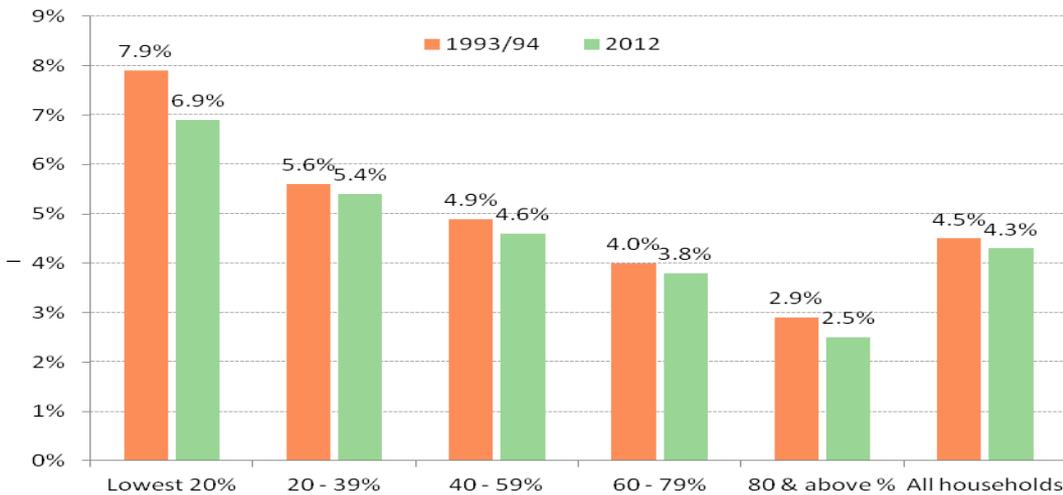


Figure 10: Expenditure on motor fuel as percentage of household income, by income quintiles, Australia, 1993-94 and 2012

Source. ABS Household expenditure Survey (HES) 1993-94, Income and Housing survey (household consumption file) 2012

Secondly, as Figure 11 illustrates, public transport usage has increased. From low levels in the 1980s, the two subsequent decades saw large growth in public transport patronage in Sydney and Melbourne. Public transport use is now back at levels similar to the early 1950s, before the boom in motor vehicle ownership. Where geographically possible, more people appear to

be switching from cars to public transport. However in terms of per capita use, public transport patronage is still well down on earlier decades, a process unlikely to be reversed given the lack of new public transport infrastructure and the continued urban sprawl of Australian cities (Grattan Institute 2015).



Figure 11: Melbourne and Sydney, public transport patronage, 1900-2010

Source: Cosgrove (2011) Table 1

A third factor influencing fuel consumption and indicative of adaptive behaviour (and also related to the previous two trends in transport usage) is the return to inner and middle ring living by more and more households (part of the reason for the large escalation in dwelling prices in these areas), and potentially meaning less dependence on the motor vehicle.

Finally, linked to the other factors and, despite the longer commuting times identified by the Grattan institute (2015), motor vehicle usage, measured by the average distance travelled, has declined. The average annual kilometres travelled in Australia was down from 15,200km in 1995 to 14,000 km in 2012 (ABS 1996 p13, 2013 p12).

As was noted in reference to trends in gas and electricity consumption, the two decades over which change in consumption is measured in this study provide a sufficient period of time to enable relatively slow adaptive changes in behaviour to occur. But overlaying the apparent evidence that consumers may be adapting more in using fuel than they are doing for electricity or gas is the effect of a 'crisis context'. Whereas electricity and gas prices increased in a relatively steady way over these two decades, petrol prices were much more unstable (see Figure 1). In the years 2000-2002 and 2006-2008 oil prices rose rapidly in relation to income, accompanied at the time by fears about peak oil. This arguably created a shock for both industry and households the former quickly produced much more energy efficient vehicles and the latter were willing to consume them, while at the same time many households, making different decisions about where to live in our cities, i.e. more public transport oriented.

The electricity industry did not experience such crisis, nor does it have the ability for rapid technological change, given its dependence on power stations that require multi-billion dollar investment to adapt or replace older power stations.

The other sobering lesson on behavioural change is that the degree of change evidenced is somewhat marginal in scale, even despite the time period of nearly twenty years. Whether measured by litres per kilometre, commuter patronage, kilometres travelled, or fuel expenditure per income, the changes in consumption are small and raise questions about the rapidity of the pace at which households can make the transformational changes required for a low carbon society. The positives are that changes can be and are being made. The negatives are whether they are fast enough to enable the degree of low carbon change required of a sustainable society!

Variation in expenditure on petrol across households

Table 7 records variations in household expenditure on petrol between 1993-94 and 2012 according to selected characteristics of households. The stability over time in expenditure patterns is evident, and discussion here will focus on the results for 2012.

The broad patterns suggested by Table 7 are:

- While fuel prices relative to income are greater for lower income earners the decline in relativities as income increase is not as great as for gas and fuel. Where the ratio of median expenditure to income for high income earners compared to those on low income is 4.0 for gas and electricity, it is only 2.7 for motor fuel. Reasons for this could include the capacity of lower income households for greater adaptive behaviour in response to motor fuel increases than to changes in gas and electricity prices, and that motor vehicles, unlike cooking, heating and cooling equipment, are a status symbol and will be consumed more by higher income households than required for just transport purposes. This may mean higher fuel expenditure than otherwise necessary relative to income.
- While there is little variation in actual weekly cost of fuel across the states (averaging \$50 a week) Tasmanian households had higher expenditure relative to income (4.9%) compared with the national average of 4.3 per cent. This is likely to be due to lower incomes than higher fuel costs however.
- Not surprisingly, motor fuel costs have an indirect relationship to dwelling type. Households in detached dwellings had median weekly costs of \$60, while those in flats of and 2 storeys (the old 1960s and 70s walk ups) spent \$35 per week. This is likely to be because multi-unit dwellings (a) accommodate smaller households who need fewer cars; (b) do not have the space to accommodate multiple vehicles; and (c) are more likely to be located in areas where public transport can be substituted for a car. We can hypothesize that as more Australians move to multi-unit living, relatively fewer motor vehicles will be required per dwelling.
- The cost of fuel for singles (\$30 per week) is much lower than for other household types. For instance a couple with three children spends \$80 per week on fuel, highlighting the impact of household composition on vehicle use. However such a household is likely to have a higher income mitigating potential hardship.

Table 7: Expenditure on motor fuel as a percentage of income, by selected household characteristics, Australia, 1993-94 and 2012

		1993-94	2012			1993-94	2012
Dwelling Structure				Tenure			
Separate house		4.6	4.5	Owned outright		4.9	4.4
Semi detached		4.3	3.8	Purchasing		4	4.1
Flat 1 -2 stories		4.5	3.9	Rent private		4.5	4.4
Flat 3 and above stories		3.8	3.1	Rent Public		5.4	5.4
Other including improvised		5.6	8.6	Other Inc. rent free		5.1	4.9
Total		4.5	4.3	Total		4.5	4.3
No bedrooms/1 bedroom		4.7	4.5	Household Composition			
2 bedrooms		4.6	3.9	Single < 65		5	4.7
3 bedrooms		4.6	4.4	Single 65 +		5.5	4.8
4 bedrooms		4.3	4.3	<i>SINGLE</i>		5.1	4.7
5 bedrooms or more		4.1	4.2	Couple < 65		4.3	3.9
Total		4.5	4.3	Couple 65 +		4.6	4.4
Equivalent Household income				<i>COUPLE</i>		4.4	4.1
Lowest 20%		7.9	6.9	Couple + 1		4.1	4.1
20 - 40%		5.6	5.4	Couple + 2		4.3	4.1
40- 60%		4.9	4.6	Couple + 3		4.9	4.4
60 - 80%		4.0	3.8	Couple + 4		4.4	4.8
80 and above %		2.9	2.5	<i>COUPLE W KIDS</i>		4.4	4.2
Total		4.5	4.3	Single + 1		5.4	5
State				Single + 2		5.1	4
New South Wales		4.4	4.3	Single + 3		5.8	5
Victoria		5	4.4	<i>SOLE PARENT</i>		5.2	4.5
Queensland		4.1	4.5	Total		4.5	4.3
South Australia		4.6	4.2				
Western Australia		4.8	4.1				
Tasmania		5.3	4.9				

Looking in more detail at the distributional effects of motor fuel, Figure 12 uses, in the absence of any other hardship measures, the same 10 per cent of income hardship benchmark as was applied to gas and electricity expenditure. Figure 12 shows that, unlike the largely stable trend found for expenditure on electricity and gas, the overall burden of motor fuel costs on the household budget has *reduced* over time. In 2012, 11.8 per cent of households spent more than 10 per cent of their income on fuel, a small drop from 14.1 per cent in 1993-94. Another difference between the expenditure patterns for gas and electricity compared with motor fuel is that for the latter the 10 per cent burden is not as heavily concentrated only on lower income households but is found in all income categories. But, for households in the lowest income quintile, the 31.5 per cent who spent more than 10 per cent of their income on motor fuel in 2012 is much higher than the 18.5 per cent whose

expenditure on gas and electricity was 10 per cent or more of their income. (see Figure 6).

Conclusions about expenditure on petrol

A number of major issues emerge from the analysis of household expenditure on motor fuel. The obvious one, and probably surprising to a lay public, is that Australians are spending marginally less as a proportion of income on motor fuel than two decades ago. This seems to result from households both having the income capacity to absorb expenditure, and making some behavioural adaptations. However caution is necessary if interpreting the latter as indicative of a societal willingness to adapt to a low carbon future because these changes were quite limited in their nature and in some cases, e.g. motor vehicle consumption, there are also trends that run counter to a low carbon option.

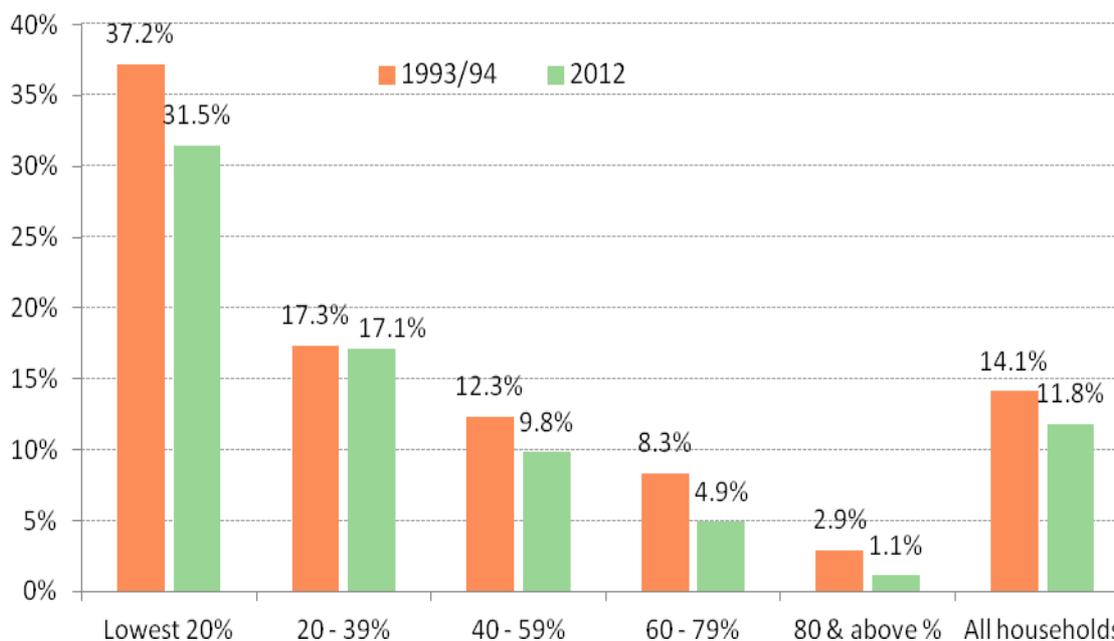


Figure 12: Expenditure on motor fuel greater than 10% of household income, by income quintiles, Australia, 1993-94 and 2012

Source. ABS Household expenditure Survey (HES) 1993-94, Income and Housing survey (household consumption file) 2012

But perhaps the key point here is the much greater impact on the household budget of the cost of motor fuel than of electricity or gas. Almost twice as many households in the two lowest income quintiles recorded motor fuel expenditure in excess of 10 per cent of their income. Yet it is the utility costs that get all the media attention in terms of hardship, and there is no equivalent to electricity and gas 'fuel poverty' for motor fuel. Nor does the ABS survey ask questions about the difficulties in paying for transport costs. Why the difference? The reasons for this could include:

- Electricity and gas users have a formal relationship with an energy provider which means there is direct client-provider contact. When things are perceived to go wrong (e.g. threat of disconnection, or notification of a price increase) there is an agency to directly blame or attribute cause. No such formal relationship exists between provider and user in the case of motor fuel: Here the relationship is largely between the purchaser and the bowser, with uncertainty as to causation when prices go up and down. Related to this formal vs. informal relationship is the fact that, in the case of electricity and gas, households can make complaints to agencies (providers, and energy ombudsmen) but there is no equivalent in the case of motor fuel.
- Because of the informal, indirect provider-client relationship there is no concept of disconnection for the motor fuel sector. If motorists cannot afford to pay for fuel they simply stop acquiring petrol, and

have to accept the associated hardship or difficulty. If consumers of electricity or gas cannot pay the utility bills, they are disconnected, but this has potentially more serious ramifications. Inability to use the car may be a major inconvenience, but non-access to utilities means the inability to refrigerate, cook, heat, cool, or light a dwelling, all of which have potential risks to health and wellbeing.

There may be a perception that motor vehicle users have choices in ways that consumers of utilities do not, i.e. the former can switch to public transport, walk or ride a bike, whereas utility users have no alternatives. If you want electricity and gas the only choice (other than solar) is between providers, and their prices are much the same. However the reality is that, the sprawling nature of our cities (beyond the public transport infrastructure) means that for many households choice in terms of transport options is no more meaningful than it is for utility users.

CONCLUSIONS AND POLICY RECOMMENDATIONS

This study has reviewed the changing nature of household energy consumption over the last two decades, looking first at gas and electricity and then at motor vehicle fuel. It has explored the issue of energy hardship, and identified the socio-economic groups most affected by changes in energy prices.

The main sources of data were the ABS Household Expenditure survey (HES) data for 1993-94 and the 2012 Household Energy Consumption file from the 2011-12 ABS Survey of Income and Housing (SIH). An important caveat is that the 2012 data does not capture the big increases in gas and electricity prices in 2013 and 2014. The effects of these price increases may (or may not) have changed the findings of the analyses, so conclusions reported here must be qualified by this.

The major finding, in relation to both gas and electricity and to motor fuel, is the remarkable stability over time in the proportion of household income committed to these energy sources. While much attention has been given to escalating energy prices during recent years such price rises appear to have had little impact on the household budget overall. The major reason is that household disposable income has kept pace with these increases, and so, arguably, there was little economic incentive for households to rein in expenditure. In addition, and demonstrably so in the case of petrol, there is evidence of household adaptation by way of different consumption patterns and lifestyle choices, which would also have enabled expenditure to be sustained without major budget impacts.

However the question raised by this finding is what happens if the economy slows and household disposable income does not keep pace with energy prices. This is not an unrealistic prospect, as the US and

most of Europe has experienced little increase in household income for almost a decade. If the same trend were to occur in Australia, the budget impacts could be problematic, with unknown implications for the political values and voting intentions of householders. Would it provoke greater opposition to any low carbon policy reforms when such reforms are associated with rising energy costs?

Another key finding is about the definition of energy poverty. When measured by 10 per cent of income committed to energy costs, it does not appear a particularly robust measure of hardship: there is little evidence that it is related to self-reported indicators of financial stress, namely the household's inability to pay utility costs. This expressed measure of hardship seems to be more useful, identifying energy hardship existing for a minority of households. Moreover the problem does not appear to be a new one prompted by rising energy costs, but rather a sustained and continuing problem over time - in short, one that is linked to structural issues in the Australian economy and society. Households experiencing hardship include lower income singles (particularly those younger than 65), sole parents and larger families. Apart from household composition, other factors which underpin and partly explain energy hardship include dependence on government pensions and benefits, living in the private rental sector, and problems of housing affordability for both renters and home purchasers. Policy reforms to mitigate energy hardship are therefore needed which go beyond the widening of eligibility for energy concessions, but which address some of these structural issues.

In short it is possible to conclude that the two decades covered by this research was a relatively benign one, as households did not have to confront major energy shocks. It was probably a period in which there was the opportunity to initiate greater low carbon reform programs than were actually undertaken. Will the next decade be so benign?



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APPENDIX 1

Gas and electricity expenditure by selected household characteristics, 2012

	Median expenditure \$ per week	Per cent of median household income per week
Income quintiles		
Lowest 20%	24	5.5 cf 5.6% on Fig 4
20 - 40%	30	3.7 (cf 3.8)
40- 60%	32	2.6 (cf 2.7)
60 - 80%	35	2.1
80 and above %	37	1.4
Total	31	2.7
Household type		
Single < 65	23	2.8
Single 65 +	20	4.3
<i>SINGLE PERSON</i>	21	3.4
Couple < 65	33	1.9
Couple 65 +	28	3.3
<i>COUPLE</i>	31	2.4
Couple + 1	40	2.3
Couple + 2	48	2.4
Couple + 3	50	2.6
Couple + 4	50	2.7
<i>COUPLE WITH KIDS</i>	45	2.4
Single parent + 1	30	3.5
Single parent + 2	36	3.7
Single parent + 3	42	4.6
<i>SINGLE PARENT</i>	34	3.7
Tenure		
Owned outright	28	3.2
Purchasing	39	2.3
Rent private	29	2.5 (2.6 in T1)
Rent Public	22	4.7 (4.8 in T1)
Other inc. rent free	29	3.2
Dwelling type		
Separate house	35	2.8
Semi detached	25	2.5
Flat, 1 -2 storeys	21	2.8
Flat, 3 or more storeys	21	1.7 (1.9 in T1)
Other	36	5.5
State		
New South Wales	31	2.7
Victoria	36	3.1
Queensland	25	2.1

South Australia	33	3.2
Western Australia	30	2.4
Tasmania	36	3.5