

Energy Equity Work Program

Research to Inform a National Energy Equity Framework: Phase 2

Data Regime

*Prepared for the Department of
Climate Change, Energy, the
Environment and Water*

**By GEER Australia
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About GEER Australia

The Group of Energy Efficiency Researchers (GEER) Australia is the peak research body on residential energy efficiency and wellbeing. It comprises researchers and industry partners from across Australia who are committed to driving change in the energy sector towards improved outcomes for Australian households. Its purpose is to improve energy-related wellbeing in households and communities in Australia, through collaborative research that achieves practical outcomes and informs future practice and policies. GEER's research and activities thus focus on energy efficiency as it relates to quality of life, health, affordability and environmental sustainability.

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Executive Summary

This report is the third of four which form the Energy Equity Work Program – Phase 2. Informed by the findings from Phase 1, and from the research findings presented in reports 1 and 2 of this Phase 2 work, this report's aim is to explore the possibility of using existing data sources to properly capture and track energy hardship, or to raise alternatives. Towards this aim, we consulted a panel of data experts in Australia for their insights and suggestions.

This report summarises the outcomes of the interviews with data experts and document reviews, regarding:

- measures needed to assess energy hardship in the Australian population
- existing data relevant to that measurement, as well as the feasibility and cost-effectiveness of accessing it
- potential new sources of data to supplement existing data and fill identified gaps.

This project assumes that a nationally representative sample of the population is required to capture the extent of energy hardship at any point in time. It also assumes that any mechanism of assessing household energy hardship needs to sample hardship at the household level. This will enable identification of specific households that are experiencing hardship or face heightened vulnerability to future hardship.

Energy hardship can be measured in multiple ways. A minimum viable set of these measures includes *energy burden*, *energy poverty*, *energy under-consumption* and *invisible energy hardship*. Gathering data to assess this range of measures requires collecting data from households themselves. No alternative means exists for some components of these measures. It therefore remains important to minimise the burden of data collection on households and find alternative sources where possible.

We identified several limitations among the non-household sources of data that we reviewed. Most are constrained as they lack a representative national sample. Also, privacy controls limit access to these data or prevent their use to identify specific households. The data have only limited capacity for connection to individual household data to allow for cohesive assessment.

Combining multiple data sources increases complexity, cost and time, so the solution with the fewest separate data sources is preferred. The single data source holding the most easily accessible data that we cannot gather directly from household is the energy retailer. In addition, energy retailers hold ready access to mechanisms for contacting and recruiting households into planned research. We conclude that a combination of household-sourced and retailer-sourced data is the most effective way of generating household-level metrics of energy hardship in Australia.



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1. Overview

Phase 2 of the research carried out under the Energy Equity Work Program for the Energy Ministers Meeting resulted in four reports. Reports 1, 2 and 3 all inform Report 4: *Better Practice Guide Towards Energy Equity*.

Report 1: Barriers, Scalability and Co-Design Findings – comprises two literature reviews: a national review of barriers and enablers to Distributed Energy Resources (DER) and Energy Efficiency (EE); and an international review of access and scalability of DER and EE programs. It also includes key findings from a co-design workshop held with a range of experts from the energy and advocacy sectors. The findings summarise suggestions regarding:

- drivers of energy hardship
- household coping mechanisms
- sector support structures
- related sector challenges.

Key findings inform reports 3 and 4.

Report 2: Household Insights and Journey Maps – comprises key findings from household interviews, including information to further inform the three energy equity frameworks developed in Phase 1 of this research:

- The Drivers Indicators Outcomes (DIO) framework
- the ABATE framework (of hardship states)
- the prevention, support or relief (P-S-R) framework.

Interviews provided a deep dive into household coping strategies and the support households sought and received. Journey maps reflect household lived experiences and synthesise five archetypical journeys through vulnerability and hardship states. This research identified three high vulnerability states in addition to the four hardship states identified in Phase 1 of the research. Key findings inform reports 3 and 4, as well as Phase 3 of this research.

Report 3: Data Regime (this report) – informed by the findings of reports 1 and 2, this report describes the findings from a co-design approach with key energy sector experts examining the use of existing data sources to capture and track energy hardship. The findings provide direction for future data needs in terms of metrics to be measured and the approach to capturing the necessary data. Key findings inform Report 4 and Phase 3 of this research.

Report 4: Better Practice Guide Towards Energy Equity – this guide is intended to help energy policy and program designers develop effective programs that reduce energy inequity. It reflects the overall findings from Phase 1 and Phase 2 of the research carried out under the Energy Equity Work Program (EEWP) for the Energy Ministers Meeting.



2. Definitions

Definitions of terms used in this report have specific meanings drawn from Phase 1 of this research, and are expanded and clarified as part of Phase 2.

Energy hardship: A state in which a household is “unable to use energy services in the home to live a comfortable, dignified and healthy life without restricting other essential needs” [1].

Drivers of energy hardship: The upstream causes or triggers of energy hardship, for example: low or interrupted income, poor dwelling energy efficiency, high energy costs. These drivers can also be considered **lead indicators** of energy hardship, that is, measures that identify people who may be vulnerable to falling into energy hardship in the future, although none of these drivers (individual or in combination) are *certain* to lead to energy hardship.

Indicators of energy hardship: Symptoms of being in a state of hardship, for example:

- thermal discomfort
- high energy consumption relative to household size
- high energy bills relative to income
- deliberate under-consumption of energy.

These measures are the most accurate and direct way of identifying people currently in a state of hardship.

Outcomes of energy hardship: The consequences of being in energy hardship, including:

- under-consumption of other essentials
- energy payment defaults
- energy debt or disconnection
- negative health and wellbeing impacts
- household mould.

These outcomes can also be considered **lag indicators** of energy hardship, that is, they reflect energy hardship that has already occurred. Thus, they cannot identify people who are vulnerable to experiencing energy hardship *for the first time*. Lag indicators of hardship can, however, be thought of as lead indicators of subsequent energy hardship, since there is clear evidence (from Phase 1 of this project) that people can fall into a spiral of compounding energy hardship. It is also noteworthy that some of these outcome indicators can be caused by factors other than energy hardship.

Low income: A “low income” household is defined in this research as one with a disposable income less than 60% of the national median income. We have chosen this threshold because it matches the Australian Tax Office low-income tax offset threshold, although we note there is no formal poverty line defined in Australia. Some Australian analyses use a similar figure, while others use 50% of median income to define the poverty line [2]. Poverty line definitions also vary internationally: the OECD uses 50% of the median income, while the European Union uses 60% of the median income.

Energy burden: An expenditure-based indicator of energy hardship that measures the percentage of household income used to pay for energy. This can be presented as a continuous percentage measure, or it can have a cut-off applied to identify what level counts as “high”. Phase 1 of this project used three times the median percentage as a cut-off, equivalent to an energy burden of 6%, to identify households with “high” energy burden. This measure is typically reported in reference to *equivalised households* (see below).

Energy poverty: An expenditure-based indicator of energy hardship which identifies households that simultaneously have low income *and* experience high energy costs relative to their income (i.e., experience high energy burden). This indicator requires specific definitions of both “energy burden” and “low income” for calculation. It can be presented as a continuous percentage measure (of energy costs for low-income households) or can have a cut-off applied to identify what level of energy cost counts as “high”. Like energy burden, this measure is typically reported in reference to *equivalised households*.

Energy under-consumption: An expenditure-based indicator of energy hardship that reflects households who deliberately under-use energy to reduce costs, with the consequence of reduced thermal comfort and/or reduced wellbeing. Typically defined as when consumption is less than half the median energy consumption of *equivalised households*, it is usually presented as a minimum cut-off applied to identify households who qualify as experiencing “under-consumption”. This measure can also be considered an outcome of energy hardship (not just an indicator), and it can be measured via self-reporting, rather than through expenditure-based metrics.

Invisible hardship: For some households, the indicators of *energy burden* and *energy hardship* are low because while they deliberately limit their energy consumption, they do not do so to the extent that under-consumption is identified. In this situation, the household pays all energy bills, doesn’t appear to be in hardship, but is reducing consumption of other goods and services (e.g., food, healthcare). So, they are experiencing a form of hardship that is not visible to the three expenditure-based measures described above. This hardship state needs a **non-energy measurement mechanism**. This measure can be considered an outcome (rather than an indicator) of energy hardship.

Equivalised households: A form of statistical control to ensure that measures of household energy use, costs and hardship take account of the external drivers of energy consumption. The drivers are especially the size of the home, the climate zone, and various factors such as the use of gas appliances and the presence of rooftop solar or batteries that have a large impact on energy consumption and costs. For example, a household might appear to be experiencing energy under-consumption and thus energy hardship, but if we know the dwelling has rooftop solar, then our cut-off for “energy under-consumption” needs to be statistically adjusted for that case.



3. Metrics of Energy Hardship



3.1 Direct Measures of Hardship (Indicators)

Hardship indicators have the advantage of being the most direct measure of the state of energy hardship. However, they cannot provide the best measurement solution in every circumstance, and they cannot always be used to identify households that are vulnerable to future energy hardship. Some indicators of energy hardship, for example, total annual cost of household energy, are relatively straightforward to define, and can be collected from households themselves or via retailers or other centralised systems. Other indicators, such as self-reports of difficulty in paying energy bills, can be collected only from households themselves, and can be contested by the claim that households may not accurately represent their own experiences, through deliberate or inadvertent bias. It is worth noting, however, that such bias may also be present in households' reports of their annual energy costs – such responses in a survey could well represent a guess rather than a careful accounting of the past year of energy bills.

In general, indicator measures can be gathered from the household themselves, or from systems that retain information about individual households. Table 1 outlines advantages and disadvantages of household and systems sources of these data.

Table 1: Advantages and Disadvantages of Data Sources

Source	Examples	Advantages	Disadvantages
Households	Surveys or interviews of a member of the household	Most direct means of accessing data – logistically simple.	Can be slower and less cost-effective. Responses may be biased. Respondent may not recall details.
Non-households	Accessing data from systems that maintain records about the household (e.g., annual billing data collected from a retailer).	Can be faster and more cost-effective to gather data for multiple households at once.	Data access often restricted by privacy controls. More logistically complex to collect.

Given these advantages and disadvantages, it is not appropriate to make a global judgement about what sources are best for gathering energy hardship data. Rather, it seems clear that some detailed measures (e.g., energy consumption over the past year) are best gathered by non-household sources (because of the risk of households being inaccurate or unable to report, as well as the imposition on households' time), while other measures (e.g., subjective stress associated with paying bills) can be collected *only* from households themselves.



3.1.1 Energy Burden

Energy burden is an expenditure-based indicator that measures the percentage of household income used to pay for energy. Phase 1 of this research (using the Household, Income and Labour Dynamics in Australia (HILDA) data set) assessed the percentage of household income used to pay for energy. Three times the median energy burden (2% of income) was used as a cut-off, identifying households with an energy burden of 6% as having “high” energy burden. This metric can define households facing heightened vulnerability as those with an energy-to-income ratio that is close to the cut-off (e.g., between 5% and 6%).



3.1.2 Energy Poverty

Energy poverty is an expenditure-based indicator that identifies households that simultaneously have low income *and* experience high energy costs relative to their income (i.e., experience high energy burden). Our estimate of households in energy poverty from Phase 1 of this project reflects the percentage of households in 2018 that the HILDA survey data indicated have a *low income* (see definitions) and *high energy costs* (energy burden of at least 6% of income). Households facing high vulnerability can be identified with this metric by defining less stringent cut-offs for energy burden and low income.



3.1.3 Energy Under-Consumption

Some households deliberately under-use energy to reduce costs, with the consequence of reduced thermal comfort and/or reduced wellbeing. These households may be defined (e.g., by European Union standards [3]) as those whose consumption is less than half the median energy consumption of comparable households. This measure is usually presented as a minimum cut-off applied to identify households that qualify as “under-consuming”. Households facing vulnerability can be assessed with this measure by adding a less stringent cut-off definition of under-consumption.



3.1.4 Invisible Hardship

For some households, energy burden and energy hardship are low because their energy consumption is deliberately limited, but not to the extent that under-consumption can be identified. In this situation, the household pays all energy bills, but is reducing consumption of other goods and services, and/or is going into debt for non-energy-related costs. Thus, the household's hardship is invisible to the three energy-based measures described above. This hardship state needs a *non-energy measurement mechanism* and, in the absence of detailed assessment of all household spending, is best assessed using qualitative self-report measures. Households facing vulnerability can be identified with such measures by setting different cut-offs for responses that represent moderate and high levels of this form of hardship.

In practice, this metric will identify *different* households to those identified by the energy burden and energy hardship measures but will likely identify some of the same households as the under-consumption measures. Note that we will not know the degree of overlap among these measures until we collect data for validation.



3.1.5 Self-Reported Experiences

A range of simple questions asked of households can provide a quick and straightforward means of identifying different aspects of energy hardship. These questions could include:

- Have you had difficulty paying your energy bills on time? (energy burden/energy poverty)
- Can you afford to keep your house warm in winter and cool in summer? (energy burden/energy poverty)
- Do you deliberately restrict your energy consumption to keep your bills low? (energy under-consumption)
- Do you go without other things to ensure you can pay your energy bills? (invisible hardship/non-energy under-consumption).

The form of such measures best suited to Australian households and conditions is being explored by other components of Phase 2 of this research and will require testing in Phase 3.



3.2 Indirect Measures of Hardship (Drivers and Outcomes)

A second group of measures is connected to energy hardship indirectly. These represent: a) measures of the drivers or precursors of energy hardship; and b) measures of the outcomes or consequences of energy hardship. Compared to direct measures, these indirect measures are fundamentally less accurate, since “drivers” may not always result in energy hardship and “outcomes” may be caused by factors other than energy hardship. However, these indirect measures often have value because they can be easier to identify, measure and track over time than direct measures. Further, some indirect measures are essential to account for (and statistically correct for) contextual influences on direct measures of hardship.



3.2.1 Energy Consumption and Billing Data

Both households and energy retailers are well placed to provide data about the energy consumption and bills of a given household. Given the seasonal changes in energy consumption common in Australia, an entire year of billing data is much more valuable than a single bill. Further, consumption and billing data are both useful, because they provide different information (energy costs are used for many indicators of energy hardship, but costs are a function of both consumption and other factors like the specific energy tariff for the household). Billing and consumption data are attached to a specific property via (for electricity) the National Meter Identifier (NMI) or (for gas) the Delivery Point Identifier (DPI) or Meter Identification Reference Number (MIRN).

For *households* to provide this information, we rely on their habits (i.e., retaining past bills), their capacity to locate those bills and their willingness to make the effort required to gather them. Previous research efforts that relied on this approach have indicated that many customers are unwilling or unable to readily provide such data. This may be particularly true for households who have recently moved home or changed retailer or for those experiencing energy hardship.

For *retailers* to supply this information, it is typically necessary to have households supply explicit informed consent for themselves or their agent to access their billing data. If, for research purposes, the customer is approached first, then researchers must help the customer identify their retailer (which some customers can have difficulty with) then gather consent, and finally approach the retailers and wait for each to supply the required data. The process is smoother if retailers are approached first; they can select a subset of customers, convey a request for data access permission on behalf of the researcher, and then provide data to the researchers.

Where households have digital interval meters for electricity (e.g., smart meters), more fine-grained consumption data will be available. To date, only Victoria has full penetration of residential digital meters, due to a mandated roll-out which began in 2006 [4]. Across the remainder of the National Electricity Market (NEM), digital metering has been driven by new building, major renovation and addition of rooftop solar. Typical penetration rates outside Victoria stand at about 25% of dwellings [5].



3.2.2 Dwelling Energy Efficiency

Precise measurement of the energy efficiency of individual dwellings is complex and involves an in-person household audit of thermal performance. While this approach has been used for high-detail technical research [6], it requires specialist skills and technical equipment, and is thus cost- and time-prohibitive for *en mass* data collection. An alternative (but much less precise) mechanism of assessing dwelling energy efficiency can be generated via year of construction. Consistent energy-efficiency regulations were introduced across Australia in 2001 (starting at the equivalent of 3–4 stars, depending on jurisdiction) and since then efficiency standards have increased in the form of increasing minimum star requirements. The current 6-star requirement applies in most Australian jurisdictions and came into effect in 2010–11 [7]. A very rough estimate of dwelling energy-efficiency performance can be derived from year of construction: dwellings built before 2001 had no formal requirement for energy efficiency and could be expected to show the poorest performance. Dwellings built between 2001 and 2010 could be expected to show moderate energy efficiency. Finally, dwellings built from 2011 onwards could be expected to show higher performance, reflecting their higher minimum construction standard. Clearly, this measure is extremely imprecise, and cannot account for buildings that over- or under-catered to the efficiency standards of the day, nor can it address the impact of major renovations or, conversely, of disrepair.

Records of the date of construction for dwellings in Australia are available through most state/territory title offices but accessing these data at scale is difficult and time-consuming. Further, given the already imprecise nature of date of construction as a measure, pursuing the accurate collection of inherently inaccurate data would be wasteful. In conclusion, simply asking households when their house was built might provide the most sensible (although very imprecise) measure of the likely energy efficiency of the dwelling. Here, speed and

simplicity of data collection take precedence over accuracy, since the cost and time requirements of accurate measures would be prohibitive.



3.2.3 Typical Energy Prices and Bills

Energy price rises in Australia have, over nearly two decades, outstripped wages growth and the Consumer Price Index (CPI) [8]. More recent estimates indicate that energy prices in Australia are expected to keep rising even more sharply: “... consumer electricity prices will increase by an average of 20 per cent nationally in this financial year and 30 per cent next year” [9]. Although these price rises provide an overall measure of the increasing pressure caused by energy costs on Australian households, they do not allow us to identify individual households facing more vulnerability, or those in more severe hardship. Similarly, measures of average bill size do not allow for identification of individual households.



3.2.4 Measures of the Proportion of Households in Poverty

The rationale for this measure as a means of assessing energy hardship is that people on low incomes are most vulnerable to increasing energy costs, are least able to change their circumstances in response and are thus most likely to experience energy hardship. This measure has the advantage of being a lead indicator, that is, it reflects a driver of energy hardship (low income) which may be used to identify people before they enter a state of hardship. That said, people with low incomes often experience multiple types of hardship at the same time, such as pressure from housing, food and healthcare costs as well as energy costs, and up to 20% of Australian households may have experienced at least one form of hardship [10].



3.2.5 Thermal (Dis)Comfort

Thermal discomfort is a household-level measure which assesses the difference between dwelling temperature and ambient temperature (e.g., a house that is unpleasantly hot when outdoor temperatures are high or unpleasantly cold when outdoor temperatures are low). Self-reported measures of thermal discomfort have been used in the European Union as part of a suite of energy hardship assessments [11,12]. Other quantitative measures have also been applied, using temperature measures to compare ambient and dwelling temperature, and to identify the temperature differential at which householders will activate energy-consuming heating or cooling appliances (e.g., heaters, air-conditioners) [13,14]. Again, such measures require instrumentation of individual houses, and are thus too expensive for large-scale data collection.



3.2.6 Winter/Summer Mortality Via Exposure to Low/High Temperatures

People in extreme energy hardship are less able to afford to regulate their thermal comfort, are more exposed to temperature extremes and are thus more likely to suffer health and wellbeing impacts from extreme weather. Abnormally cold and dry winter weather has been associated with increased death rates in Australia [15]. Heatwaves in the Australian summer have also been linked to increased mortality. Heatwave weather events generate greater loss of life than any other natural hazard in Australia [16].

Using weather-related mortality measures, which are in the order of 20–30 deaths in any given year, is not a useful means of measuring the impact of energy hardship. First, these deaths are relatively rare, and this low incidence reduces their value as a means of tracking hardship. Unless we gather data over multiple years, cases are insufficient in number to draw strong statistical conclusions about contributing factors other than the weather. Second, these deaths represent only the most extreme consequence of energy hardship, since people who suffer ill-health or reduced wellbeing without dying are not included in such data. Finally, these mechanisms reflect an *outcome* of energy hardship. Such measures cannot help to identify people who are facing heightened vulnerability, nor can they identify people in hardship in time to offer them additional assistance or remediation.



3.2.7 Other Factors Influencing Energy Consumption

The Australian Energy Regulator (AER) consumption benchmarks [17] have demonstrated that across Australia, energy consumption of electricity and gas is substantially influenced by:

- climate zone
- household size
- season
- presence of controlled load (usually for electric hot water)
- presence of rooftop solar

- presence of a pool
- whether the household uses a combination of electricity and gas or electricity alone.

Ideally, all these factors would be measured when collecting data for assessment of energy hardship to control, as completely as possible, for factors that influence energy consumption but which are *not* directly related to hardship. However, it is noted that many of these factors are not visible to retailers, networks or regulators, so gathering such information would require additional data collection from households themselves. It is noted further that climate zone can be estimated accurately from postcodes, and seasonal impacts on energy consumption can be controlled for by gathering 12 months of billing/consumption data.

3.3 Recommendations for Energy Hardship Metrics

For some indicators of energy hardship, households themselves are the only sensible or appropriate data source. For other indicators, some centralised mechanisms are likely to be more cost-effective (i.e., lower cost per accurate record), while others are prohibitively expensive or cannot be disaggregated to the level of individual households. In conclusion, **some engagement with households for these measures is unavoidable**. It remains important, however, to find other ways to gather data that do not rely on households' recall or record-keeping abilities, and do not impose unnecessarily on households for their time and effort. This is especially true since the households of interest already struggle with energy hardship or are facing heightened vulnerability, and adding complexity to their lives is counter to the goal of identifying and remediating hardship.



4. Sources of Hardship Data

4.1 Existing Data

This section presents existing data sources (both large scale and smaller scale) which might be able to provide some of the measures needed to generate our target metrics of energy hardship. We consider the scale of the data, and its accessibility, representativeness and cost-effectiveness of use.

4.1.1 Large-Scale Sources

Several large-scale data sources already active in Australia might provide data to inform measures of energy hardship. We focus on data sources that include information about income, household characteristics and demographics, and/or energy consumption or costs, and which can be used to access a large and ideally nationally representative sample.

Australian Energy Regulator

The Australian Energy Regulator (AER) collects and maintains data sets on residential energy consumption across multiple states as part of their role. The data they gather are submitted by energy retailers, thus representing a substantial corpus of data on consumption and billing for many households over long periods. The AER also retain data on debt and hardship programs [18]. However, some substantial limitations must be noted regarding the potential for these data to be accessed for research purposes.

- The data held by regulators are very carefully protected by legislated privacy control mechanisms, so access is tightly controlled. Under most scenarios, only aggregated data can be shared with third-party researchers, and such data is not suited to calculating hardship metrics for individual households.
- The data are understood to not include contact details for consumers (e.g., phone numbers or email addresses) other than their residential address. This means that if access is negotiated, only paper mail could be used to contact customers to seek permission to use their data. This would be a slow and expensive exercise.
- AER data does not include Victoria, the Northern Territory or Western Australia. Other mechanisms would be needed to access data from these jurisdictions.

Australian Bureau of Statistics

The Australian Bureau of Statistics (ABS) gathers and manages extensive data about the Australian population, including data that is measured at the household level and could be used to generate energy hardship metrics. However, to date, the ABS has not routinely gathered data on household energy costs. The ABS conducts ongoing household surveys, but similar to HILDA (below), a very long process is involved in having new questions for such surveys approved and added, and third-party access to ABS data is tightly controlled. For the current project to engage with ABS, substantial lead time and complexity of negotiation would be required. Furthermore, the ABS data controls might require the bureau to conduct analyses in-house rather than provide household-level data to this project, even if it were first de-identified.

HILDA

The HILDA survey [19] is a longitudinal survey that monitors the spending and income of a large number of households, and arguably provides the most detailed mechanism for tracking household income and expenditure over time in Australia. This data set includes cases from all the states and territories, and is often used to analyse households' income, wealth and wellbeing progression through life stages. HILDA uses self-reported measures of energy costs (but not consumption), relying on householder access to energy billing records, and thus would be expected to show some inaccuracy on these measures compared with formal organisational records.

Use of HILDA data as a basis for gathering measures of energy hardship is probably unrealistic. Because the existing data sets do not include all the specific measures necessary to build a robust metric, we would need to either:

- negotiate access to identified data to enable direct contact with participants for gathering additional information (a process which is effectively impossible given controls involved in protecting research participants from inappropriate claims on their time and privacy)
- or
- negotiate the addition of new questions to the HILDA survey, and then wait while additional data is collected (a process that is possible but would involve extensive delay, given the large lead time required).

Other Commonwealth Agencies

The Australian Tax Office and the Commonwealth Department of Human Services (Services Australia) hold between them extensive and detailed records relating to income, tax paid, government pensions and other payments. These agencies' strong privacy controls make it extremely unlikely that this project could negotiate access to these data. In any case, the data do not include energy cost information and thus would not be sufficient on their own for our needs. Using data from these sources is unrealistic.

4.1.2 Smaller-Scale Sources

Gas and Electricity Retailers

Energy retailers retain extensive information about their residential customers, including:

- physical address
- phone number and email address
- history of billing and consumption data
- historical payment records and debts
- whether there is a concession holder in the household to allow for reduced charges.

They do not hold data on household income, household size or other factors that we require to effectively assess energy hardship.

Gas and Electricity Networks

Networks can access consumption and (sometimes) billing data, but do not have access to customer contact details beyond the physical property address. Networks access household-level data via the Metering Business System (MBS), which is a data management system designed to support network management and decision-making; it is not intended as a repository of extensive customer details. Reportedly, networks have no power to require individual retailers to share customer contact details, and retailers are formally required to ask the permission of their customers before sharing their data with third parties. In sum, networks have access to consumption data, but have no clear mechanisms to gather other household-level data, or even to efficiently contact householders to ask for their permission (via phone or email).

Energy Consumers Australia Surveys

The Energy Consumers Australia (ECA) administers surveys on national samples each year. These provide an ongoing gauge of how consumers feel about energy supply issues and the energy industry [20]. The surveys cover attitudinal, sentiment and behavioural data, but do not measure energy costs. These processes could not be easily expanded to include energy cost and additional demographic data without completely changing the nature of the surveys.

AER Bill Benchmarking Survey

The AER bill benchmarking survey captures household energy costs (for both electricity and gas) and has been conducted every three years since 2011. Its aim is to provide a large representative sample (numbering in the thousands) of energy bills for households in different circumstances [17]. The aim of this survey is to enable the creation of “benchmarks” that appeared on retail bills to help households understand how their energy consumption and costs compare with other similar households. To allow for sensible comparison, the bill benchmarking survey gathers data on household characteristics to allow for equivalising (see definitions) – that is, it compares households with other similar households by separating them based on factors that influence energy consumption and costs.

The survey has not collected data on household income, so the existing data cannot be used to generate historical energy hardship metrics. In addition, the survey was last conducted in 2020 and it has reportedly been discontinued. Prior versions of the survey, however, do provide a useful template for collecting data on many of the energy consumption, energy cost and household demographic factors that are of interest in the current project.

Other Data Sources

A variety of other smaller data sources exist among an array of smaller entities and agencies (e.g., energy ombudsman offices, financial counselling services, social service entities, advocacy groups). Depending on their specific focus, these sources involve different forms of data that relate to energy hardship (in particular, energy debt, complaints about problems with retailers and access to household-level support services). However, these data sources tend to exist at a sub-national level. This means that the data they collect cannot be easily combined into national-level data. Furthermore, these data do not include measures of income and household demographics and energy costs, cannot be accessed for privacy reasons and/or represent historical rather than current data.

Conclusion

All these sources of data are either fragmented, cannot be joined together to create a useful or accurate national sample, could not be easily expanded, and/or are most typically attached to the outcomes or longer-term consequences of energy hardship – that is, failure to pay, seeking alternative assistance for debt, and so on. Thus, **none of the existing data sources, even with adjustments, can provide the data necessary to generate metrics of energy hardship** that are representative, accurate, cost-effective and sustainable. We conclude that **some collection of new data will be required** to generate measures of energy hardship.

4.2 Potential New Data

This section considers the mechanisms for gathering new data that might be most suitable (cost-effective, representative and accurate) for providing the necessary energy hardship measures.

4.2.1 Quantitative Surveys

Surveys with households are likely to be an important mechanism for gathering data on energy hardship. As noted above, some elements of hardship metrics can *only* be supplied by households. However, gathering all information from households is problematic – large, detailed surveys are time-consuming and annoying to complete and, typically, the longer the survey, the lower the data quality.

A useful rule of thumb is that a survey of households should be as short as possible to minimise imposition on respondents, and that researchers should therefore also find other mechanisms of gathering the same data, where possible. For example, if energy retailers already know which customers are on a government concession, then we could more quickly and efficiently collect that data from the retailer than from a large group of households. However, it should be noted that prior advocacy work in Victoria has found that some households meet eligibility for concessions that has not been conveyed to the retailer, so those households are paying more for energy than they should [21]. This issue would not be captured in retailer data.

4.2.2 Qualitative Interviews

Qualitative interviews are time-consuming and labour-intensive, but provide rich data about reasons, connections, changes over time and decision-making processes of households. They are not a cost-effective mechanism for gathering a national benchmark of hardship but may provide a useful means of exploring elements that are hard to gather from surveys, identifying considerations and drivers that surveys have excluded. In particular, for the process of validating robust metrics in survey results, interviews with households are essential.

4.2.3 Direct Measurement

Direct measurement involves energy/appliance auditing, attaching digital meters to houses (for energy consumption, indoor temperature, etc.), and/or ongoing monitoring of the household so that exact measures

of consumption, energy costs and other costs can be tracked over time and compared between households. This kind of exercise is expensive and time-consuming. It essentially trades money and time for accuracy and control, and can thus only ever be run on a relatively small sample. There is value in this approach because of the high levels of accuracy it can provide, but it cannot realistically be applied to provide a convincing benchmark of hardship at a national scale.

4.2.4 Other Mechanisms for Extending Data Access or Providing Better Data

Multiple other mechanisms might enable easier access to consumer energy data in the future. Each is discussed below.

Consumer Data Right

The Consumer Data Right (CDR) [22] was implemented by the Australian Competition and Consumer Commission (ACCC) as a mechanism of managing third-party access to consumer data while maintaining consumer ownership of their data. The CDR process is designed to enable third-party service providers with the goal of offering tailored services to easily access detailed consumer data, with the *explicit informed consent* of consumers. The CDR process has three stages:

1. Institutions that hold consumer data (so far, banks and energy retailers, with more sectors to be included over time) are required to make these data accessible in a consistent fashion, in a way that allows identification of individuals and which includes ongoing updates as new data are collected over time.
2. Service providers can seek accreditation from the ACCC to be allowed access to individual CDR data (which remains in the originating organisation), on the condition they can demonstrate strict data protection processes, privacy controls and insurance protections.
3. When a consumer chooses, they can give *explicit informed consent* to a service provider to access their personal data (e.g., energy consumption data), so the service provider can use real data to generate a recommendation for the consumer (e.g., which energy tariff might best suit them).

The provision of data by energy retailers for access through CDR is staged. To date, larger retailers have made their data available; retailers with fewer than 10,000 customers are yet to do so. When the data connection process is complete, all energy retailer data will be available via the CDR system. In turn, it will then become possible for a researcher to, first, request permission from research participants (via *explicit informed consent*) to access their data and, next, access energy data from research participants via the CDR instead of applying to their individual retailers.

However, while such a research process would clearly be of benefit to the current project, it would still require formal accreditation through the ACCC, which would involve a substantial investment of time and effort. It should be noted that the CDR is not intended as a research mechanism but rather as a means of allowing consumers to derive value from data held about them, by allowing service providers to generate advice tailored to individual consumer needs. It is not yet clear whether using the CDR as a research tool would be feasible or cost-effective, mostly because of the complexity of the accreditation arrangements, which are aimed at commercial entities not research organisations.

Energy Security Board

The Energy Security Board (ESB) [23] is a collaborative effort involving the Australian Energy Market Commission (AEMC), the Australian Energy Market Operator (AEMO) and the AER. Together with other energy market stakeholders, the ESB manages the transition of the energy market in Australia, specifically with reference to the National Energy Market. The ESB is pursuing, among other projects, a strategy of improving data access and data connection to capitalise on the digitalisation of systems, to simplify energy data-sharing and to help realise benefits for energy network bodies and for consumers. This strategy includes a focus on adjusting existing regulation, addressing market failures and improving coordination mechanisms. ESB recommendations and projects are ongoing, with the process planned to continue until 2025.

AER Towards Energy Equity Strategy

The 2022 Towards Energy Equity Strategy [24] released by the AER represents a concerted effort to improve outcomes for consumers experiencing energy vulnerability by:

- improving identification of those consumers
- reducing market complexity

- strengthening consumer protections
- using consumer experiences to inform regulatory changes
- improving affordability.

The strategy has strong overlap with the current research, especially relating to “improving identification”. It is still in the planning and consultation stages. Currently, it is unclear how long these processes will take, or what the outcomes of the strategy will be, although reportedly some changes may be implemented as early as mid-2023.

AER Compulsory Notices

The AER has a legislated mechanism of Compulsory Notices [25] which enables them to request specific data from energy retailers. In theory, this mechanism could be used to require any (or all) retailers to provide consumer data so that they could be used to inform the current equity research. However, this power is designed for apply for legislative (not research) purposes, and requires extensive consultation with the AER board, external stakeholder engagement and regulatory oversight. Thus, it is unlikely to be a useful mechanism for this project. Also, as noted above, the AER has no capacity to require data from Victoria, the Northern Territory or Western Australia.

Conclusion

This range of mechanisms *might* enable better access to *some* data, providing useful input for the current project's data needs. However, none of these mechanisms can be activated rapidly.

4.3 Recommendations for Data Sources

Data sources used to measure aspects of energy hardship need to be:

- accessible (privacy controls make such access difficult in many cases)
- current (historical data is of less value)
- comprehensive (rather than a small sample, or a sample taken from a specific state or area, or type of household)
- connected or connectable (rather than unrelated data sets that cannot be joined together)
- measured at the household level.

Note that aggregating household-level data is a standard mechanism to improve accessibility by removing concerns about privacy (since aggregated data cannot identify individuals). However, aggregated data can be used only to give general indications of hardship [26]. For example, data on energy costs and incomes aggregated at the postcode level might be able to draw some conclusions about postcodes that are more susceptible to energy hardship, but:

- not everyone in a postcode that is “susceptible to vulnerability” will be in hardship
- some people in non-susceptible postcodes will be in hardship
- individual households in hardship cannot be identified in this way, so support that applies to individual households cannot be provided.

To achieve the aims of this project and measure energy hardship, we must talk to households. Some of the data we need can be accessed no other way. Of the data we need that is not easily or efficiently accessible from households themselves, the single best source is the energy retailer, which holds almost all the other data we need. While retailer data is complex to access, it is nevertheless less complex and time-consuming than every other large-scale data option we have examined.





5. Data Regime

5.1 Existing Data Sources

In this section, we provide details of the specific data sources we propose to use to generate energy hardship metrics in the most cost-efficient way possible. As noted above, we conclude that **a combination of energy retailer and direct household contact is the best approach**. We envisage that we will start with retailer contact, asking them to contact customers on our behalf with an invitation to participate and, for those who agree, we will use retailer-provided contact details to send survey links. For customers who agree to let us access their data held by retailers and provide additional survey responses, we will be able to combine data and calculate energy hardship measures.

Accessing retailer data will rely on gaining the substantial cooperation of multiple retailers. No single retailer covers the entire country, so for a national sample, multiple retailers would be needed. Some retailers provide both electricity and gas, others only one or the other, so coverage of gas and electricity as well as national representation will be a necessary focus.

Retailers are extremely busy, operate in a tightly regulated environment and, like the rest of the energy system in Australia, are impacted by falling public opinion, rising prices and uncertainty around the transition away from fossil fuels to renewable sources of energy. It will not be easy to secure their cooperation for a project that requires additional logistical and data management resources (especially since, anecdotally, data management staff in retailers are rare and their time is extremely valuable). Conversely, involvement in a project that offers customer incentives (via a bill credit) and aims to identify people in energy hardship would provide retailers with a potential boost in their customer sentiment.

Costs to retailers include:

- staff time
- marginal costs of out-of-bill-cycle customer contact
- data processing
- marginal costs of dealing with additional customer queries generated by the project.

Retailers can provide (once Explicit Informed Consent has been received):

- a mechanism for first contact and permission-seeking with customers, from a known source
- a mechanism to randomly select customers for contact (which can be stratified based on location and energy bill size to improve representative sampling)
- households' home addresses (including postcodes, which in turn can be used to generate climate zone data)
- customer contact details, including phone numbers and email addresses (which can facilitate quicker research interactions)
- information about presence of rooftop solar panels and/or controlled loads
- details of customer concession status (although this could be collected from households, since data accuracy is a concern for this measure)
- detailed energy consumption and billing data, for the most recent 12-month period (as long as the customer has been with the retailer for at least 12 months)
- historical data on bill payment, energy debt and involvement in hardship programs (to help ensure a sufficient sample of households that may be more likely to be experiencing energy hardship).

5.2 New Data Sources

Surveys of households (online or paper- or telephone-based) can potentially provide all (or almost all) the data we need but using households as a sole data source can be problematic. As noted earlier, households may be unable to provide some data with sufficient accuracy or detail. Self-reported estimates of energy consumption and energy bills are not sufficiently accurate to be useful for this research.

Detailed household interviews (in person or by telephone) can provide extensive additional detail and depth but are cost-prohibitive to conduct at scale. They may have a role in gathering information about changes over time, background influences and/or decision-making; and they also represent a means of validating survey findings, as noted earlier.

Household surveys should be kept as short as possible. One way to achieve this is to trial longer surveys in a pilot study, analyse these early results and then cut back questions that do not provide much additional explanatory power beyond other variables (and thus do not provide marginal benefit for statistical equalisation of households). We envisage that surveys of householders will include:

- number of people in the household
- household income
- self-reports about difficulty paying energy bills, changing behaviour to afford energy bills, etc.
- self-reports of the age of the dwelling (for a rough indication of its likely energy efficiency)
- rental/mortgage status
- self-reports of the presence of a swimming pool or air-conditioner.

If we cannot find a retailer to collaborate with us for this work, then it would be possible to conduct data collection via direct contact with households first. This approach would involve:

- accessing survey panels to make initial contact with households and screening them for interest and suitability
- asking each household to give explicit informed consent for us to access their retailer-held energy data
- asking each household to complete a survey or interview
- connecting each household's energy data and survey results.

This second approach is logistically more complex and time-consuming, since we would need to contact each individual customer's retailer (for gas and electricity) and convey the data access request. In turn, we would then rely on multiple retailers to extract and supply the requested data, which could take a long time. This method also makes it more difficult to engage with and access households who are experiencing hardship, because we would not be starting with retailer guidance to help generate a representative sample.

A third approach would be to remove retailer involvement altogether, and instead rely on households themselves to locate and provide us with their energy bills for the past year. As noted, this approach would produce lower-quality data, because:

- households may not be able to access and convey their old bills
- the survey would be more time-consuming to complete.

5.3 Summary, Final Recommendations and Alternative Approaches

Table 2 summarises the data needed to calculate energy hardship measures, as well as the potential sources of those data. It includes considerations around access and feasibility.

Table 2: Sources of Data and Other Details

Measures	Needed for	Source(s)	Notes
Current energy stress and coping mechanisms (qualitative findings, Phase 2)	Householder experiences, identifying hardship state	Householder self-reports	No other way to obtain these data
Records of historical energy stress	Past householder experiences, identifying hardship state	Householder self-reports, retailer records, ombudsman records, financial advisory service records, community-based service providers	All non-householder sources are fragmented, partial and inefficient to collect in a large sample
Energy costs (both gas and electricity) and tariffs	Calculating hardship indicators	Retailer, AEMO, AER, ABS, householder (requires past bills)	Retailer is simplest source; ABS data cannot be linked to individuals
Household income	Calculating hardship indicators	Householder, ATO, DHS, ABS	ATO and DHS data unlikely to be available due to privacy controls; ABS data cannot be linked to individuals
Postcode (proxy for climate zone)	Identifying comparable households	Householder, retailer	—
Age of house (rough proxy for energy efficiency of dwelling)	Identifying comparable households	Householder (estimate), state-based title office records	Title record searching is not feasible in a large sample
Concession status	Identifying comparable households	Householder, retailer, DHS	DHS records inaccessible due to privacy controls
Appliance energy efficiency	Identifying comparable households	Requires energy audit	Not feasible in a large sample – seems to be no effective way to gather these data at scale
Rooftop solar/batteries	Identifying comparable households	Householder, retailer (battery uncertain), installers	Householder or retailer most feasible
Number of bedrooms (proxy for size of dwelling)	Identifying comparable households	Householder, builder	Householder most feasible
Number of occupants	Identifying comparable households	Householder	—

In conclusion, this project requires data directly from households and energy retailers. The single potential data source holding the most easily accessible data that we cannot gather directly from households is the energy retailer. Involving retailers attends to a second purpose, as they are well equipped to provide a mechanism for contacting and recruiting households into the research. Adding more data sources increases complexity, cost and time, so the solution with the fewest separate data sources should be preferred.

If we can secure retailer participation, the advantages would be:

- reducing the cost, time and complexity involved in collecting data
- reducing the need for additional data collected from householders themselves, which in turn reduces the burden of the survey and improve data quality.

The disadvantages of involving retailers are:

- We need to locate retailers and convince them to collaborate.
- We need multiple retailers to obtain a sample that covers the whole country.
- Retailers will likely have difficulty convincing householders to participate in the research. It will be important to conduct this approach with care, since households tend to distrust energy retailers and this is likely to be especially true for householders facing hardship.

If we cannot secure retailers to participate, the alternatives would be:

- waiting until data access problems are resolved by other accessibility processes that are currently underway (this would introduce an unpredictable delay)
- exploring alternative mechanisms to approach householders, for example, by using customer advocacy groups or local community groups (this would likely substantially improve rates of participation due to higher levels of trust, but would also require a very large coordinated effort, and would not resolve problems accessing energy billing data unless we still involve the retailer)
- conducting a longer householder survey without retailer or advocate support (with associated risks of poorer quality data and lower access to households facing hardship).



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Appendices

Appendix A: Engagement Processes

Method

This report is informed by multiple interviews with various energy industry stakeholders, especially people who have carriage of some specific data collection mechanisms, who are responsible for data sources or who use those data sources in conducting their work. We conducted these interviews in November and December 2022, usually by phone or online, and while they were typically single-person interviews, some involved up to five staff in a group interview. As per the CSIRO ethics approval for this project, we gave the participants detailed information about the project, and assured them that their individual identity would not be published.

Note that the approach we used here was not designed to be representative of the energy industry, advocacy groups or the research community. Rather, it was targeted specifically at people who managed, controlled or used data relating to:

- household energy hardship
- energy consumption
- household income
- other related measures.

The goal of this engagement was specifically to discuss ways in which data could be accessed and used, as well as to consider what new data could be collected that would address current gaps.

Sample

From the energy industry, we had discussions with:

- three network businesses (transmission network service providers)
- one energy retailer
- the AER
- one fossil fuel company.

From those involved in data collection, we had discussions with staff involved in:

- HILDA
- the ABS
- a private energy data provider
- two university-based energy researchers.

From consumer advocacy groups, we had discussions with:

- ECA
- Energy Users Association of Australia
- the Australian Council of Social Service
- St Vincent De Paul
- two Energy Ombudsman Offices
- the Consumer Policy Research Centre
- the Consumer Action Policy Group.

Questions

The interview discussions were semi-structured, beginning with an introduction to the project and the ethics controls and then moving through a series of broad opening questions in the following areas:

1. What sources of data do you collect, manage and/or use that relate to energy consumption and associated issues for householders?
2. What are the rules and mechanisms associated with access of data that you control?
3. What other sources of data do you access?
4. What new data sources might be useful to inform your own work?

We asked other questions to gather additional detail as the discussion progressed. Discussions typically ran for 45 to 60 minutes.