* 1. Bill Benchmarks Household dataset variable lists

This document contains the definitions of each of the variables in the Bill Benchmarks datasets. There are four datasets in total. They are:

* Bill Benchmarks household survey data (*hh\_data.csv*)
* Accumulation meter electricity consumption data (*accumulation\_data.csv*)
* Smart meter electricity consumption data (*smart\_data.csv*)
* Gas consumption data (*gas\_data.csv*).

The following sections contain a summary of key variables in each dataset.

* + 1. Bill Benchmarks household survey data

The first five variables relate to identification and reporting of households:

* id — a unique ID for each respondent, used to link the household to energy consumption data
* id\_nmi\_dnsp — the electricity DNSP for the household, identified through the National Metering Identifier (not included in this dataset)
* id\_mirn\_dnsp — the gas DNSP for the household, identified through the Meter Installation Registration Number (not included in this dataset)
* source — method used to collect the household observation. Options are:
	+ panel —the main online survey, which was based on online ‘panels’ of individuals
	+ open — survey accessed through public link, shared through social media (e.g. twitter)
	+ ausnet — survey accessed through links provided by Ausnet services to its customers
	+ citipower — survey accessed through links provided by Citipower / Powercor to its customers.
* Survey\_Status — indicator for whether the household completed the survey
	+ ‘1’ indicates the survey was completed
	+ ‘0’ indicates the survey was not completed.

*Remaining variables relate directly to the survey questions, which are presented below:*

S1. To ensure we survey a good cross-section of Australian households, can you please tell us which of the following regions do you live?

Please select one.

* 1. Sydney
* 2. Regional NSW
* 3. Melbourne
* 4. Regional VIC
* 5. Brisbane
* 6. Regional QLD
* 7. Canberra
* 8. Regional ACT
* 9. Adelaide
* 10. Regional SA
* 11. Perth
* 12. Regional WA
* 13. Darwin
* 14. Regional NT
* 15. Hobart
* 16. Regional TAS

S2. Do you consent to your electricity and gas distributors providing your Energy Data to ACIL Allen and the Australian Energy Regulator, understanding that you will not be identifiable from any published data?

* 1. Yes
* 2. No

Q1. How long have you lived at your current address?

Please enter a number for each:

* Years: [VALID NUMERIC RANGE 0 → 99]
* Months: [VALID NUMERIC RANGE 0 → 11]

Q2. Do you contribute to paying the energy bill and/or decisions about using energy?

* 1. Yes
* 2. No

Q3. Do you have solar panels that generate electricity (i.e. not solar hot water)?

* 1. Yes
* 2. No

Q4. Do you identify as

* 1. Male
* 2. Female
* 97. Other (specify)
* 99. Prefer not to Answer

Q12. How old are you?

* + 1. 18-29
	+ 2. 30-50
	+ 3. 51-65
	+ 4. Over 65

Q5. Do you operate a business from home?

* 1. Yes
* 2. No

Q6. Does the business use a lot of energy (e.g. doing the accounts for a business from home would not use much energy, but operating large tools or similar would)?

* 1. Yes
* 2. No

Q8. Do you have gas at your home?

* 1. Yes, I have a mains connected gas supply
* 2. Yes, I have mains gas but I don’t get a separate bill (it might be part of the strata fees for your apartment or similar)
* 3. Yes, I have bulk bottled gas that is piped into the house (not just for BBQ)
* 4. No

Q7. We need to ask you for some information from your electricity bill. Also, if you have mains gas, we need to ask for some information from your gas bill as well.

These should be the bills for the place you live most of the time, so if you have a bill for a holiday home or office/workplace, please don’t use that one.

If you do *not* have your bill handy, please close your browser window now, to exit this survey. Once you have your bill you will be able to click on the survey link and return to the survey. Selecting “No” below will terminate the survey, meaning you will not be able to complete it later.

* 1. Yes, I have my bill(s) in front of me at present, and I am ready to continue with the survey.
* 2. No, I will not be able to locate my bill(s) therefore I cannot participate in this research.

[NSW, ACT, VIC, QLD, SA, TAS]: There is a number on your electricity bill known as a NMI (National Metering Identifier). It is a 10 or 11 digit number, possibly including letters. It is not your account number or your meter number. Your NMI will be located on the top left corner of your bill, as shown in the image below. If your bill was emailed to you, you may need to click through to your retailer’s website to find your NMI.



[FOR NT]: There is a number on your electricity bill known as the Customer ID. It is a 9 digit number with a dash on your bill (may include some zeros at the start).

[ALL]: Please enter the NMI number/Customer ID from your electricity bill. Please take care doing this. It is very important for the study that this is accurate.

Q9. To answer the next question you will need your gas bill. This must be the gas bill for the same place of residence as the electricity bill you just used. This is so we can get a complete picture of your household’s energy consumption.

If you do *not* have your gas bill handy, please close your browser window now, to exit this survey. Once you have your bill you will be able to click on the survey link and return to the survey.

* 1. Yes, I have my gas bill in front of me at present, and I am ready to proceed with the survey.
* 2. No, I don’t have my gas bill handy – however I would still like to continue with this survey.

The meter number used for gas is called a MIRN (Meter Installation Reference Number). It is a ten or eleven digit number. It is *not* your account number. It will be on your gas bill, sometimes on the second page.

Here is a sample bill with the MIRN highlighted to help you find it.



Q10. What is your postcode?

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Q11. Which of the following best describes where you live?

* 1. Rural/not in a town or city
* 2. Small regional centre
* 3. Major regional centre
* 4. State capital city

Q13. What is the highest level of education that you have completed?

* 1. Did not complete year 12
* 2. Completed year 12
* 3. Trade certificate or apprenticeship
* 4. Other certificate or diploma
* 5. Other post school qualification
* 6. Bachelors degree
* 7. Post graduate degree
* 97. Other (please provide details)

Q14. Apart from yourself, how many other people live in your household?

* Please enter the number
* No others – I live alone

Q15. How many of the others you live with are in each of the following age groups?

* 1. 0-4:
* 2. 5-12:
* 3. 13-17:
* 4. 18-29:
* 5. 30-50:
* 6. Over 50:

Q16. How many are

* 1. Friends or housemates:
* 2. Partner or spouse:
* 3. Parents or other adult family members (include your children aged 18+):
* 4. Dependent adults:
* 5. Children under 5:
* 6. Children aged 5 to 12:
* 7. Children aged 13 to 17:

Q17. Do you:

* 1. Own your home outright
* 2. Mortgage your home
* 3. Rent your home
* 97. Other (please provide details)

Q18. What type of dwelling do you live in?

* 1. Separate house
* 2. Semi-detached townhouse, row, terrace house, villa etc.
* 3. Apartment, unit
* 97. Other (please provide details)

Q19. When was your home built?

* 1. After January 2014
* 2. Between January 2005 and December 2013
* 3.Between 2000-2004
* 4. During the nineties
* 5. Eighties
* 6. Seventies
* 7. Before the seventies
* 99. Don’t know

Q20. When was your home last renovated substantially (more than redecorating)?

* 1. After January 2014
* 2. Between January 2005 and December 2013
* 3. Between 2000-2004
* 4. During the nineties
* 5. Eighties
* 6. Seventies
* 7. Before the seventies
* 8. Never renovated
* 99. Don’t know

Q21. Over the past years have you changed any of the following appliances?

* 1. Cooktop
* 2. Oven
* 3. Water heater
* 4. Heater/heating system
* 99. None of the above

Q21b. For each appliance that you changed, did you also change ‘fuel’? Please select the nature of this change by using the drop-down boxes below:

* Cooktop: <Electric to gas; Gas to electric; No change>
* Oven: < Electric to gas; Gas to electric; No change >
* Water heater:
	+ From < Electric; Gas; Solar boosted electric; Solar boosted gas; Solar; Other; No change>
	+ To < Electric; Gas; Solar boosted electric; Solar boosted gas; Solar; Other; No change>
* Heater/heating system: < Electric to gas; Gas to electric; Wood to gas; Wood to electric; No change >

Q22. Is your home insulated?

* 1. Yes, thoroughly insulated (e.g. batts in the walls and ceiling)
* 2. Yes, ceiling insulation only (e.g. batts in the ceiling but not walls)
* 3. Partly (e.g. insulation in some parts of the home but not others)
* 4. There is no insulation
* 99. Don’t know

Q23. How many of each of these rooms do you have in your home?

* 1. Bedrooms: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or more
* 2. Bathrooms: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or more
* 3. Other rooms: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or more

Q24. How many weeks was your home empty in the last 12 months, for example because you were on holiday during…

* 1. Summer:
* 2. Autumn:
* 3. Winter:
* 4. Spring:

Q25. How far is your home from a harbour or the sea?

* 1. Less than 5km
* 2. 5-20km
* 3. 21-50km
* 4. 51-100km
* 5. More than 100km
* 99. Don’t know

Q26. How many of the following largeappliances do you have?

* 1. Gas cooktop: 0, 1, 2, 3, 4, 5 or more
* 2. Electric induction cooktop (includes a glass top) : 0, 1, 2, 3, 4, 5 or more
* 3. Electric cooktop (older style with elements): 0, 1, 2, 3, 4, 5 or more
* 4. Microwave: 0, 1, 2, 3, 4, 5 or more
* 5. Dishwasher: 0, 1, 2, 3, 4, 5 or more
* 6. Electric Oven: 0, 1, 2, 3, 4, 5 or more
* 7. Gas Oven: 0, 1, 2, 3, 4, 5 or more
* 8. Electric BBQ: 0, 1, 2, 3, 4, 5 or more
* 9. Mains gas (not bottles): 0, 1, 2, 3, 4, 5 or more
* 10. Bottled gas: 0, 1, 2, 3, 4, 5 or more
* 11. Fridges with freezer component: 0, 1, 2, 3, 4, 5 or more
* 12. Fridge only units: 0, 1, 2, 3, 4, 5 or more
* 13. Freezer only units: 0, 1, 2, 3, 4, 5 or more

Q26b. In what condition is your fridge/freezer? If you have more than one, consider the one you use most.

* 1. Great it’s new
* 2. Not new but good
* 3. Not good
* 4. Poor
* 5. Very poor

Q27. How many of the appliances you just entered are commercial kitchen appliances?

* 1. Cooktop
* 2. Oven
* 3. Fridge

Q28. Approximately how many small kitchen appliances do you have in total (e.g. toasters, kettles coffee machines, rice cookers, blenders, food processors etc.)?

* 1. less than 5
* 2. 5-10
* 3. 11-15
* 4. 16-20
* 5. More than 20

Q29. How many of each of the following laundry appliances do you have?

* 1. Clothes dryer: 0, 1, 2, 3, 4, 5 or more
* 2. Top load: 0, 1, 2, 3, 4, 5 or more
* 3. Front load: 0, 1, 2, 3, 4, 5 or more
* 4. Combined washer dryer: 0, 1, 2, 3, 4, 5 or more

Q30. How many water heaters do you have?

* 1. Electric: 0, 1, 2, 3, 4, 5 or more
* 2. Electric and solar: 0, 1, 2, 3, 4, 5 or more
* 3. Electric heat pump: 0, 1, 2, 3, 4, 5 or more
* 4. Gas storage: 0, 1, 2, 3, 4, 5 or more
* 5. Gas instantaneous: 0, 1, 2, 3, 4, 5 or more
* 6. Gas and solar: 0, 1, 2, 3, 4, 5 or more
* 7. Solar without boost: 0, 1, 2, 3, 4, 5 or more
* 8. Other: 0, 1, 2, 3, 4, 5 or more

Q30b. You mentioned that you have an “other” type of water heater. Can you please describe the type of water heater this is?

* [OPEN END]

Q31. How many of each of the following entertainment appliances do you have?

* 1. LCD/LED televisions: 0, 1, 2, 3, 4, 5 or more
* 2. Plasma televisions: 0, 1, 2, 3, 4, 5 or more
* 3. Sound system (count multi-zone systems like *Sonos* as one system per zone) : 0, 1, 2, 3, 4, 5 or more

Q32. How many small entertainment appliances do you have (e.g. sound system, games console, radio, heated pet enclosures etc.)?

* 1. Fewer than 5
* 2. 5-10
* 3. 11-15
* 4. 16-20
* 5. 20+

Q33. How many computer equipment/office appliances do you have (e.g. mobile phones, desktop computers, laptop computers, tablets, printer/scanner/shredder etc.)?

* 1. Fewer than 5
* 2. 5-10
* 3. 11-15
* 4. 16-20
* 5. 20+

Q34. Have you replaced any of the following appliances?

Selected out of following options

* 1. Dishwasher
	+ 1. Fewer than 3 years ago
	+ 2. More than 3 years ago, but less than 5
	+ 3. More than 5 years ago
	+ 4. N/A – I have not replaced
* 2. Clothes dryer
	+ 1. Fewer than 3 years ago
	+ 2. More than 3 years ago, but less than 5
	+ 3. More than 5 years ago
	+ 4. N/A – I have not replaced
* 3. Washing machine
	+ 1. Fewer than 3 years ago
	+ 2. More than 3 years ago, but less than 5
	+ 3. More than 5 years ago
	+ 4. N/A – I have not replaced
* 4. Television
	+ 1. Fewer than 3 years ago
	+ 2. More than 3 years ago, but less than 5
	+ 3. More than 5 years ago
	+ 4. N/A – I have not replaced

Q36. How many of each of the following types of room heating do you have?

* 1. Electric ducted central heating: 0, 1, 2, 3, 4, 5 or more
* 2. Split system air conditioning unit that you use as a heater: 0, 1, 2, 3, 4, 5 or more
* 3. Electric under floor heating: 0, 1, 2, 3, 4, 5 or more
* 4. Individual electric room heaters in regular use: 0, 1, 2, 3, 4, 5 or more
* 5. Electric hydronic: 0, 1, 2, 3, 4, 5 or more
* 6. Gas ducted central heating: 0, 1, 2, 3, 4, 5 or more
* 7. Gas underfloor heating: 0, 1, 2, 3, 4, 5 or more
* 8. Individual gas room heaters in regular use: 0, 1, 2, 3, 4, 5 or more
* 9. Coal or wood fires in regular use: 0, 1, 2, 3, 4, 5 or more
* 10. Slow combustion stove in regular use: 0, 1, 2, 3, 4, 5 or more
* 11. Gas hydronic heating: 0, 1, 2, 3, 4, 5 or more
* 12. Other heating (if 1 or more, please provide details on the following screen) : 0, 1, 2, 3, 4, 5 or more

Q36b. You mentioned that you have an “other” type of room heating. Can you please describe what type of heating this is?

* [OPEN END]

Q37. How many of each of the following types of room cooling do you have?

Please select one per row.

* 1. Room air conditioner (old ‘window rattler’ style): 0, 1, 2, 3, 4, 5 or more
* 2. Split system air conditioning unit (refrigerated cooling unit is partly inside and partly outside): 0, 1, 2, 3, 4, 5 or more
* 3. Ducted reverse cycle (refrigerated) air conditioner: 0, 1, 2, 3, 4, 5 or more
* 4. Ducted evaporative cooler (these are not capable of heating and generally do not cool as much as reverse cycle): 0, 1, 2, 3, 4, 5 or more
* 5. Portable refrigerated: 0, 1, 2, 3, 4, 5 or more
* 6. Portable evaporative: 0, 1, 2, 3, 4, 5 or more
* 7. Other (if 1 or more, please provide details on the following screen) : 0, 1, 2, 3, 4, 5 or more

Q37b. You mentioned that you have an “other” type of room cooling. Can you please describe what type of cooling this is?

* [OPEN END]

Q38. What condition is your air conditioner in (if you have multiple, please describe the one you use most)?

* 1. Great it’s new
* 2. Not new but good
* 3. Not good
* 4. Poor
* 5. Very poor

Q39. Do you have medical equipment or life support equipment needing electricity?

* 1. Yes
* 2. No

Q40. Do you have electric water pumps for irrigation or house supply (not pools etc)?

* 1. Yes
* 2. No

Q41. Do you have a swimming pool?

* 1. Yes
* 2. No

Q42. Do you have a spa?

* 1. Yes
* 2. No

Q43. Equipment that can be turned on using a remote control uses power unless it is turned off at the wall. This is sometimes called ‘standby’ mode.

Thinking of appliances in your house with standby mode, how often are they typically turned off at the wall or unplugged (this includes if they are turned off by a power saving switch)?

Please select one.

* 1. Never unplugged/switched off at the wall
* 2. Not unplugged/switched off at the wall very often
* 3. Unplugged/switched off at the wall about half the time
* 4. Unplugged/switched off at the wall very often
* 5. Unplugged/switched off at the wall whenever they are not actually in use
* 99. Don’t know

Q44. Typically, how many times a week do you use the following appliances?

* 1. Dishwasher
	+ 1. None
	+ 2. Once a week
	+ 3. 2-3
	+ 4. 4-5
	+ 5. 6-7
	+ 6. 8-10
	+ 7. More than 10 times a week
* 2. Washing Machine
	+ 1. None
	+ 2. Once a week
	+ 3. 2-3
	+ 4. 4-5
	+ 5. 6-7
	+ 6. 8-10
	+ 7. More than 10 times a week
* 3. Clothes Dryer
	+ 1. None
	+ 2. Once a week
	+ 3. 2-3
	+ 4. 4-5
	+ 5. 6-7
	+ 6. 8-10
	+ 7. More than 10 times a week

Q45. Do you turn your heater on and off to manage the temperature, or turn it on and leave the thermostat to operate?

* 1. Turn it on and off
* 2. Rely on the thermostat and/or programming

Q46. Thinking about the way you use your room heating, which of these statements is most accurate?

* 1. Summer
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 2. Autumn
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 3. Winter
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 4. Spring
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day

Q47. Thinking about the way you use your room cooling, which of these statements is most accurate?

* 1. Summer
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 2. Autumn
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 3. Winter
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day
* 4. Spring
	+ 1. Never runs
	+ 2. Runs some days for part of the day
	+ 3. Runs some days for mostof the day
	+ 4. Runs many days for part of the day
	+ 5. Runs many days for most of the day

Q48. At the beginning of the survey you indicated that you have solar panels that generate electricity. What is the total capacity (number of kW) of your solar panels?

* Please enter your total capacity, in number of kW. If you are unsure, please select “Don’t know”.

Q49. When did you install your solar panels? If you have had them upgraded since they were installed, please specify when you had them upgraded instead of when they were installed.

* Month
* Year
* Don’t know

Q50. Do you have battery storage?

* 1. Yes
* 2. No

Q51. What is the capacity of your battery storage system (in kWh)?

* Please enter number in kWh. If you are unsure, please select “Don’t know”.

Q52. When did you install your battery storage system? If you have had this upgraded since it was installed, please specify when you had this upgraded instead of when it was installed.

* Month
* Year
* Don’t know

Q52a. Would you considered installing a battery system?

Please give a brief reason for your answer.

* 1. Yes, and the reason is (please specify):
* 2. No, for the reason that (please specify):

Q53. Do you get a concession on your electricity bill?

* 1. Yes
* 2. No
* 3. Prefer not to say

Q54. Do you receive a government pension or benefit (other than family benefit)?

* 1. Yes
* 2. No
* 3. Prefer not to say

Q55. What is the gross (before tax) annual household income? If you live with a partner, it will be your combined income, otherwise your income alone.

* 1. Less than $18,200
* 2. $18,201-$37,000
* 3. $37,001-$87,000
* 4. $87,001-$180,000
* 5. More than $180,000
* 99. Don’t know/prefer not to say
	+ 1. Accumulation meter and smart meter electricity consumption data

The electricity consumption files bring together over 25 files of electricity consumption data into two datasets. A standard set of cleaning routines has been applied to each of the original files to ensure consistency between all data from accumulation meters, and likewise for smart meters.

Some households may be present in both datasets (i.e. data from both accumulation and smart meters), and this may include an overlap in the periods for which data are reported via each meter.

Each row in the accumulation meter dataset can be interpreted as a ‘bill’ read for a register on the meter. The variables include:

* Id — a unique ID for each respondent, used to link the household to energy consumption data
* enddate — the end date of the bill
* startdate — the start date of the bill
* regtype — the register type:
	+ 1 = import (e.g. general consumption)
	+ 2 = controlled load / dedicated circuit
	+ 3 = export (e.g. excess PV generation)
* dnsp — the dnsp that provided the data
* cons — consumption for the bill (in kWh)

Each row in the smart meter dataset corresponds to a day of half-hourly register consumption reads for the household. The variables include:

* id — a unique ID for each respondent, used to link the household to energy consumption data
* date — the date that the reads correspond to
* regtype — the register type
	+ 1 = import (e.g. general consumption)
	+ 2 = controlled load / dedicated circuit [note: Citipower/Powercor controlled load was not able to be separated out, and so is included in the ‘import’ register)
	+ 3 = export (e.g. excess PV generation)
* dnsp — the dnsp that provided the data
* Period1 to Period48 — half-hourly consumption reads (in kWh). Period 1 corresponds to the half-hour from 12:00 am to 12:30 am, Period 2 to 12:30 am to 1:00 am, and so on.
	+ 1. Gas consumption data

The gas consumption file brings together 13 files of gas consumption data into a single dataset. A standard set of cleaning routines has been applied to each of the original files to ensure consistency between all consumption data.

Each row in the gas consumption dataset can be interpreted as a ‘bill’ read for the household. The variables include:

* Id — a unique ID for each respondent, used to link the household to energy consumption data
* restariff — an indicator for whether the household is on a residential consumption tariff
	+ 1 = household is on a residential tariff
	+ 0 = household is not on a residential tariff
* enddate — the end date of the bill
* startdate — the start date of the bill
* dnsp — the dnsp that provided the data
* cons — consumption for the bill (in MJ)