



Australian Government

Department of Climate Change, Energy,
the Environment and Water
Office of Energy Economics

Australian residential consumption & end use reporting

APERC Worksop Presentation

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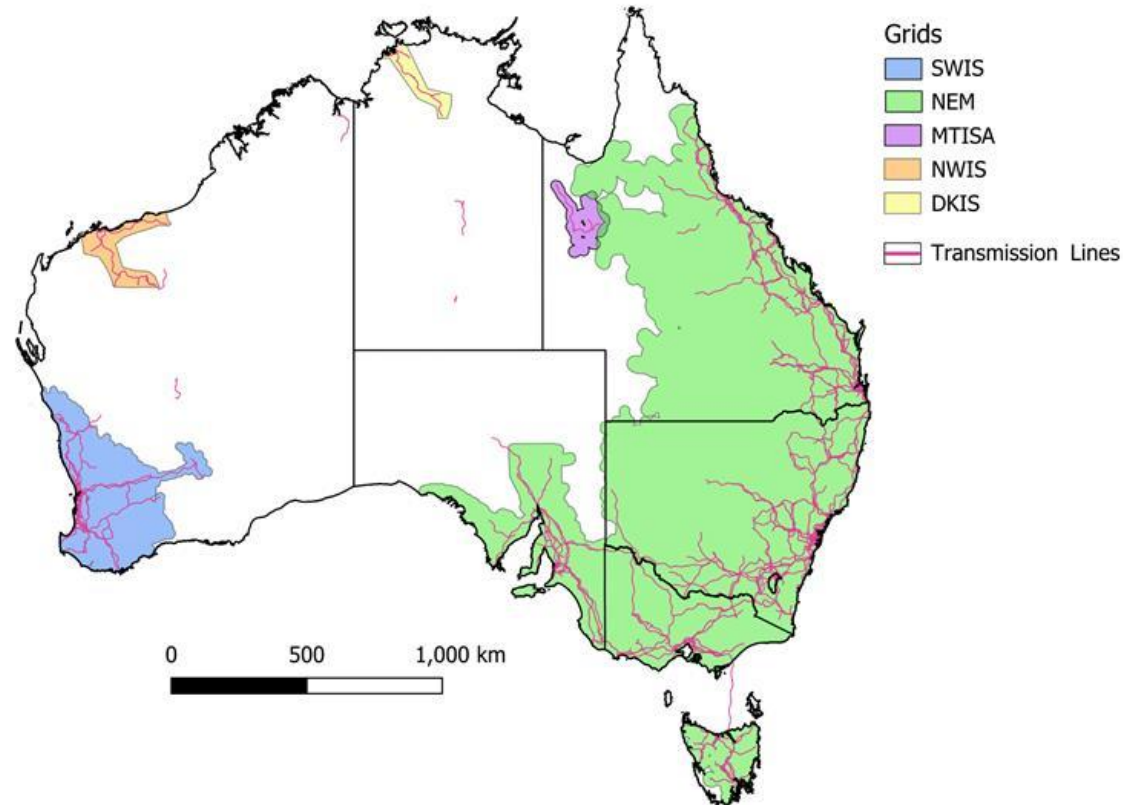




We acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

Background on Australian residential energy

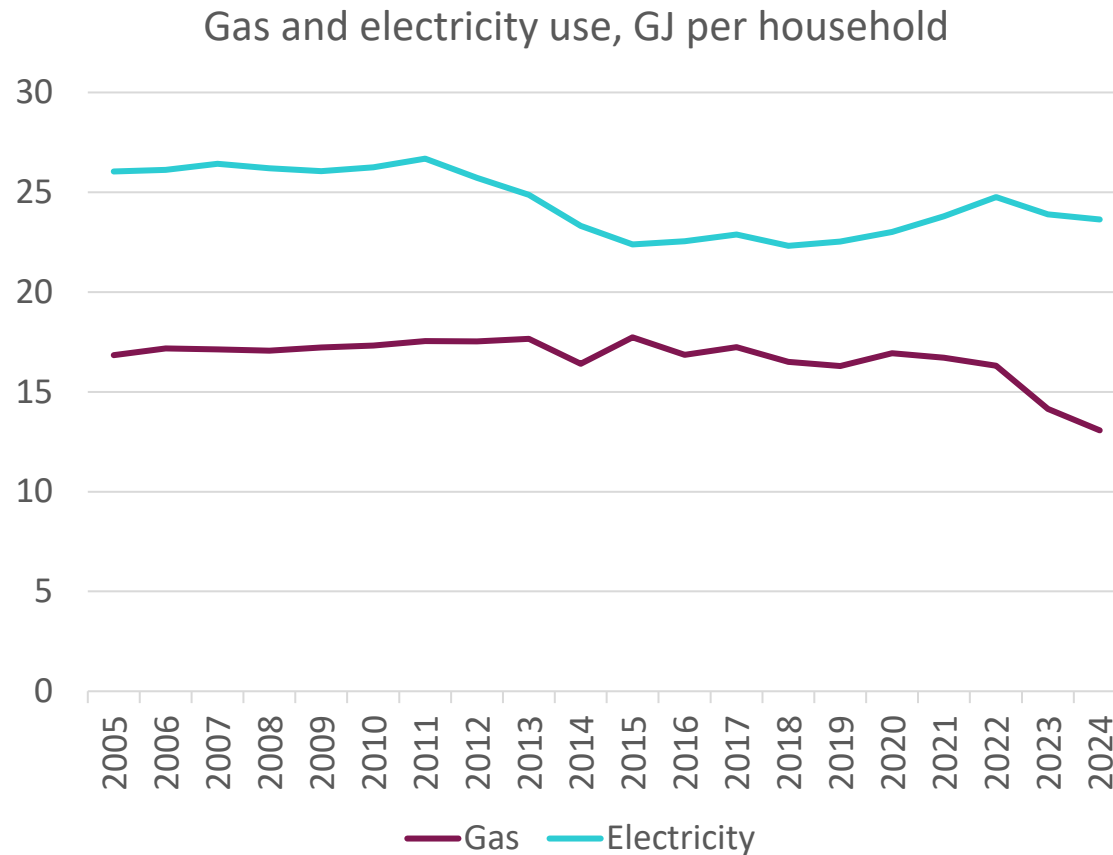
Geographical extent of major Australian electricity distribution grids



Sources: Department of Climate Change, Energy, the Environment and Water internal analysis

- Electricity and natural gas networks administered by state governments
- Total residential consumption collected from distributors for each state
- Other fuels, less detailed sources:
 - LPG
 - Solar hot water
 - Wood

Official residential consumption statistics

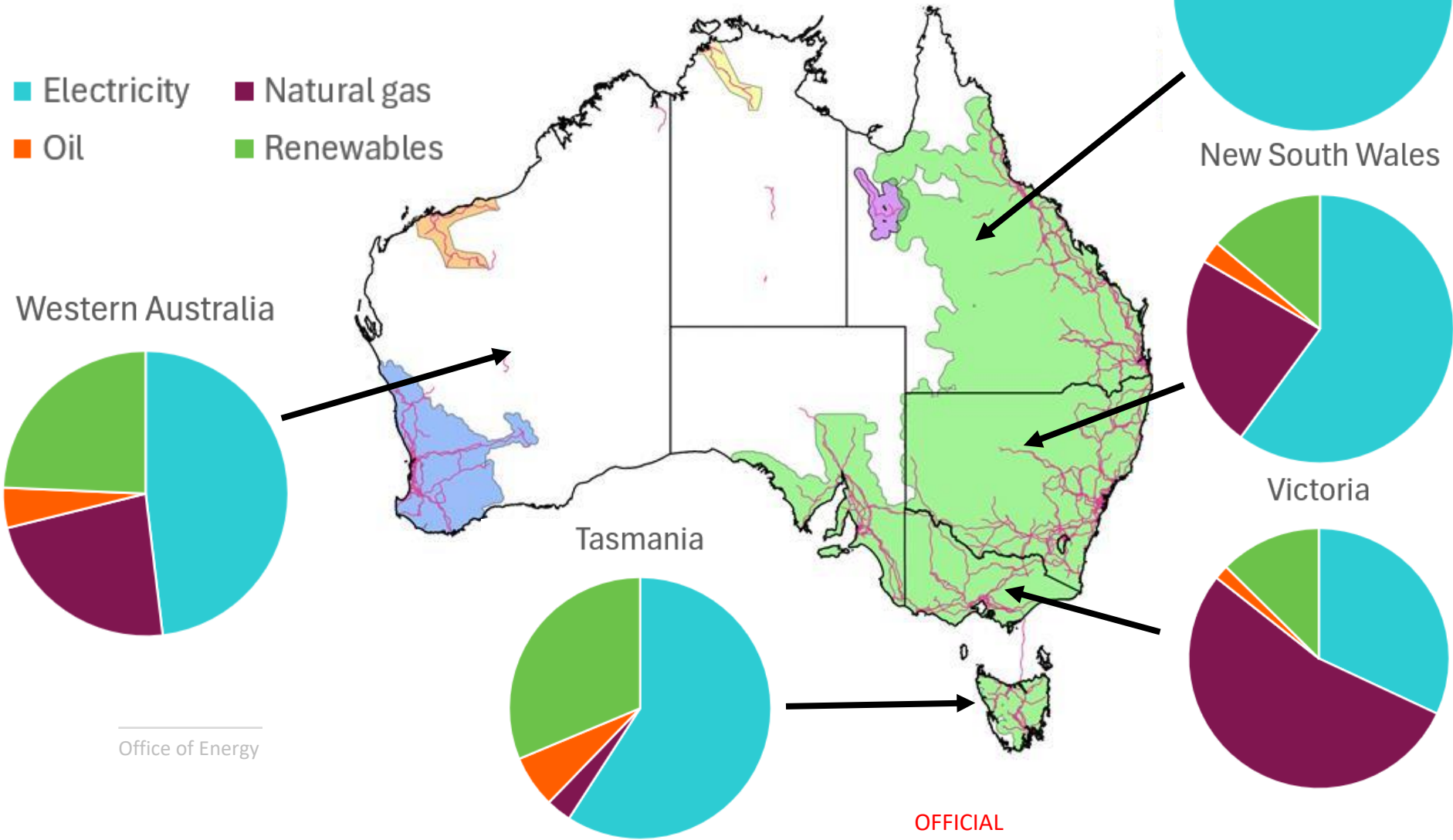


- Residential sector = 12% of Australian Total Final Energy Consumption
 - 53% electricity
 - 29% natural gas
 - 15% renewables (solar hot water and wood)
- Household electricity use started decreasing around 2011, rose during Covid-19
- Gas use has started declining in recent years, driven by the state of Victoria

State activity varies widely

Residential energy consumption in selected Australian states

■ Electricity
 ■ Natural gas
 ■ Oil
 ■ Renewables



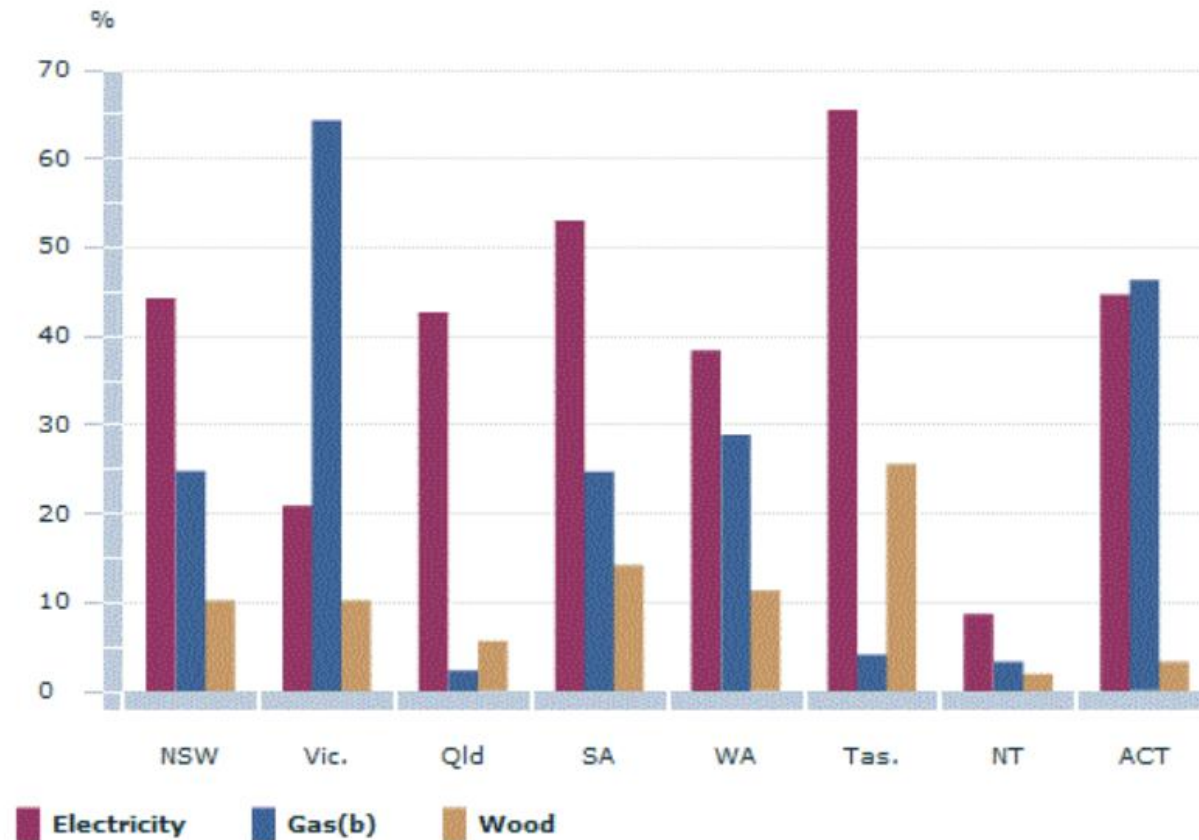
- National figures obscure great regional variation
- Gas penetration in households ranges between states from below 10% to above 80%
- Need for heating and cooling varies

Data Sources for Residential end use

- I. Energy Use and Conservation, Mar 2014
- II. Household Energy Consumption Survey 2012
- III. Residential Baseline Survey

I. Energy Use and Conservation Survey (1994-2014)

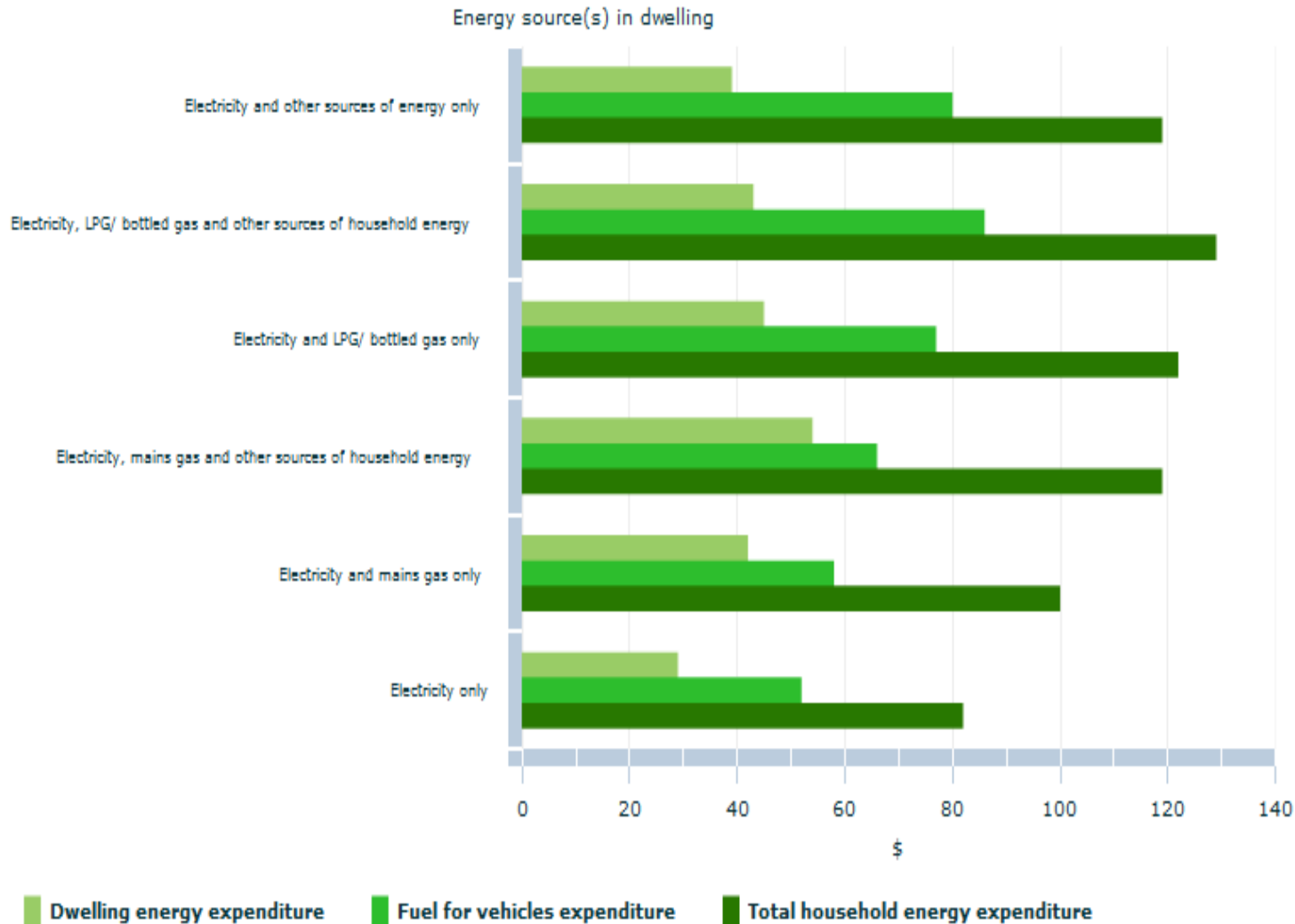
Graph 4 - Proportion of households that used selected sources of energy for heating(a)



- Large sample household survey by Australian Bureau of Statistics
- Attached to Labour Force Survey
- Three-yearly from 1994 until 2014
- Usage of various fuels and appliances on a presence/absence basis
- No volume or expenditure data

II. Household Energy Consumption Survey 2012 (2014)

Household energy expenditure by type & energy source



- Large sample household survey by Australian Bureau of Statistics
- Attached to Survey of Income and Housing
- Expenditure information
- Fuel sources used
- Dwelling and household characteristics
- Appliances and technologies
- Survey responses linked to meter data via billing information
- Enabled consumption data to be linked to survey information

III. Residential Baseline Study 2021

“In essence, the RBS consists of a large database of information on all the different products that are in Australian and New Zealand homes, and on the number, size, efficiency and use characteristics. It is this underlying product data which is then combined using formulae relevant to each product to calculate how much energy each of the products uses annually.”

- RBS is our current source of household end use estimates
- This is a model build of bottom-up product/appliance energy use estimates (eg chart to the left)
- Data sources include:
 - Census data
 - Electricity network administrative data
 - ABS household survey data
 - Sales data
 - Regulatory information
 - Market studies



III. Residential Baseline Study 2021

For each product:

Annual Energy Consumed (AEC) = Stock Numbers * Unit Energy Consumption (UEC)

For energy demand:

Total Power Demand = Stock Numbers * Unit Power Demand (UPD)

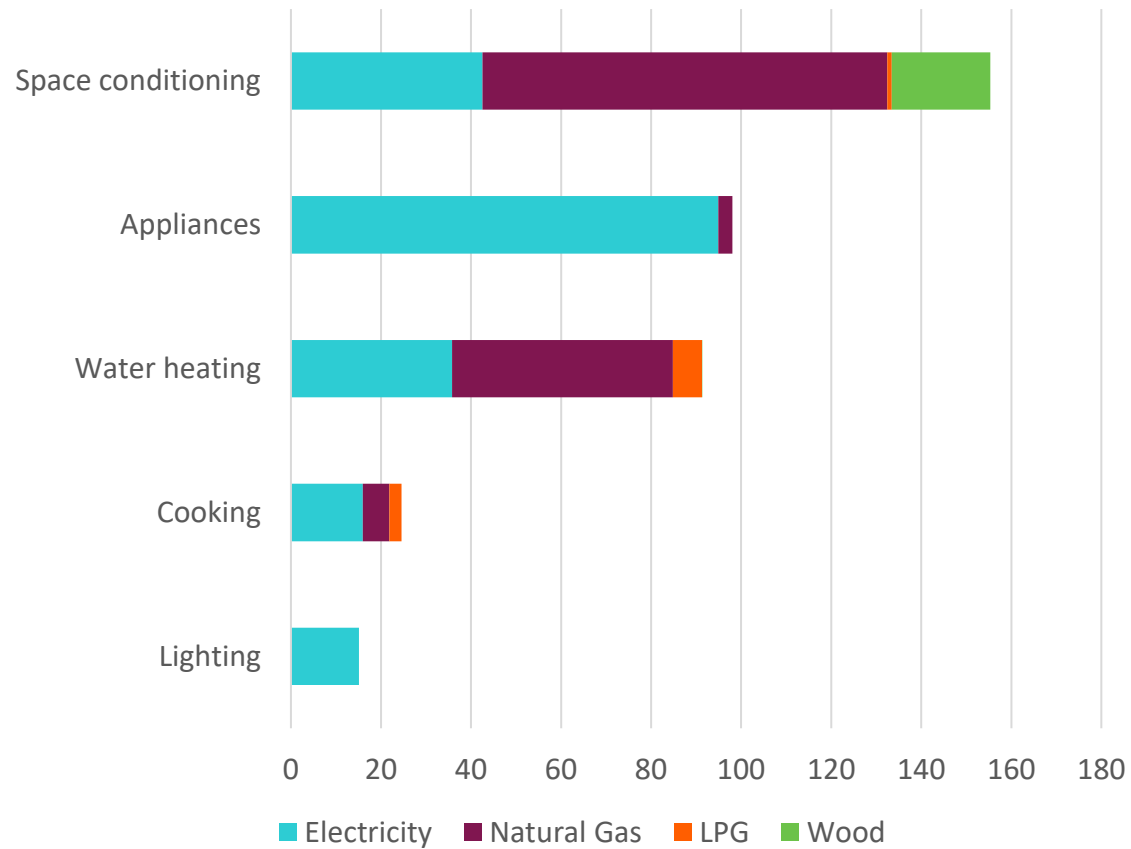
The inputs to determine unit energy consumption are:

- Sales
- Efficiency
- Usage
- Life
- Standby when relevant

- Total energy use is derived by applying **use and energy information** for appliances to **total stock** of those appliances
- Stock Models used for both appliances and building types
 - Stock changes over time
- The RBS outputs and technical info is currently available here: [2021 Residential Baseline Study for Australia and New Zealand for 2000 to 2040 | Energy Rating](#)

III. Residential Baseline Study 2021

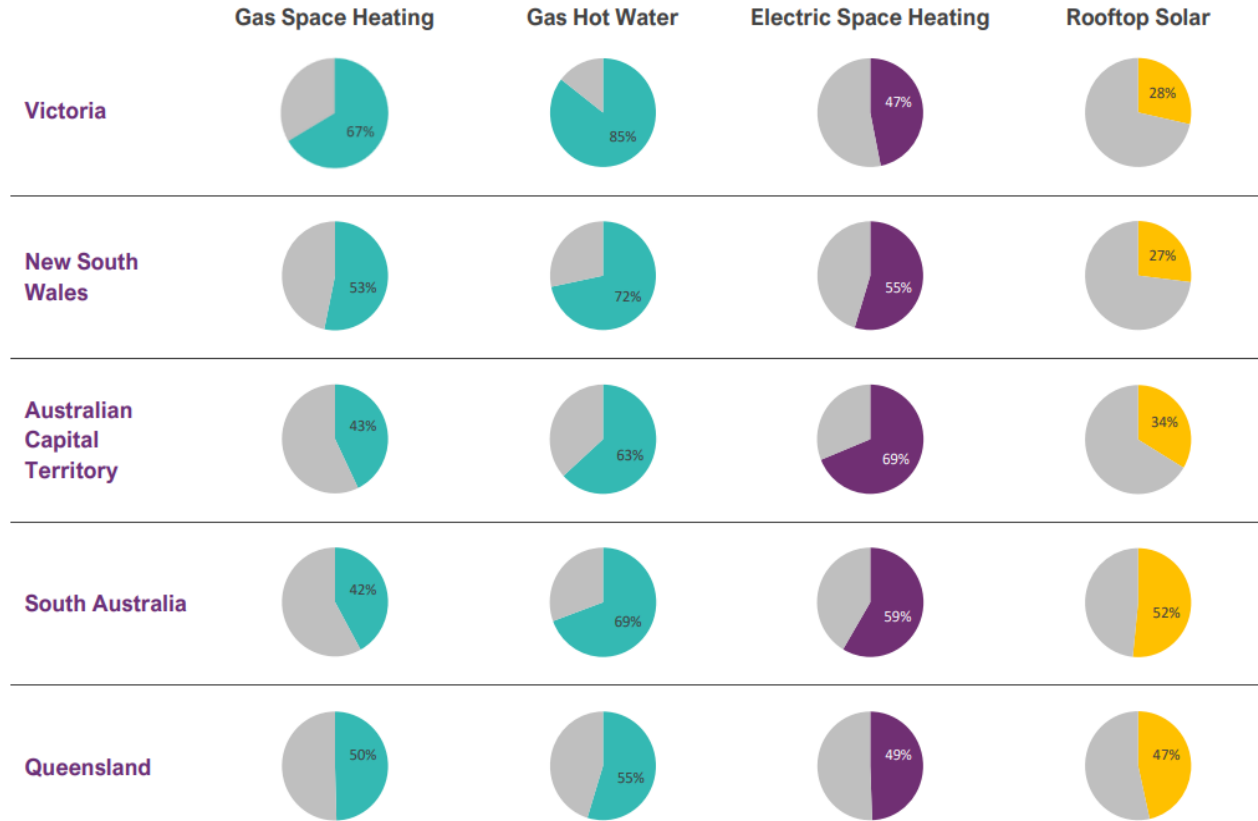
2021 estimated end use by fuel (PJ) (RBS 2021)



- The bottom-up model allows aggregate estimates to be built (eg this chart)
- 2021 edition updated on 2015 edition
 - Intended to fill data gaps left by discontinued survey program
- Does not assume long term Covid impacts

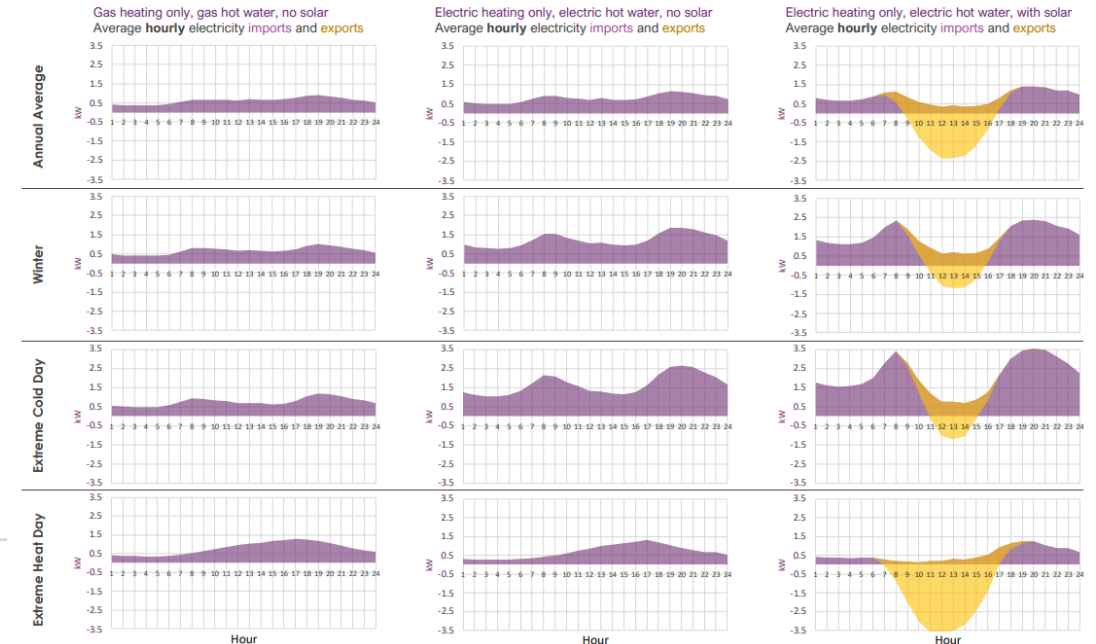
Future Research

Figure 1 Estimated appliance adoption rates in residential dwellings with a gas connection, by region – 2023 CY



- The future is likely to be greater usage of administrative data
- Australia is unlikely to return to a substantial survey program of household appliances and activities
- Smart meters are now widespread and can facilitate some end use estimates via cohort segmenting:

Figure 16 Average hourly demand for dwellings with a gas connection, Australian Capital Territory – 2023 CY



Questions?



Contact us

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