



Climate Council of Australia

Submission to: Submission to the Senate Economics References Committee inquiry into residential electrification

Addressed to: Senate Standing Committee on Economics

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About the Climate Council

Climate Council is Australia's own independent, evidence-based organisation on climate science, impacts and solutions.

We connect decision-makers, the public and the media to catalyse action at scale, elevate climate stories in the news and shape the conversation on climate consequences and action, at home and abroad.

We advocate for climate policies and solutions that can rapidly drive down emissions, based on the most up-to-date climate science and information.

We do this in partnership with our incredible community: thousands of generous, passionate supporters and donors, who have backed us every step of the way since they crowd-funded our beginning as a non-profit organisation in 2013.

To find out more about the Climate Council's work, visit www.climatecouncil.org.au.

1. Introduction and context

Australia faces two interlinked crises: climate change and the cost of living. Electrification, along with greater energy efficiency, is a key part of the solution to both.

Climate change is already threatening lives and livelihoods. Extreme weather disasters, including dangerous heat waves, extreme downpours and devastating fires, are becoming more frequent and severe. Worse is to come but we can substantially limit future harms by rapidly cutting greenhouse emissions this decade.

To play our part in global efforts, Australia must aim to reduce emissions by 75 per cent below 2005 levels by 2030 and reach net zero by 2035 (Climate Council 2021, 2023a). Australia's current emissions reduction target is 43% below 2005 levels by 2030; yet Federal Government projections indicate that we are not currently on track to achieve this (DCCEEW 2022). We must do more. Ensuring all of Australia's 10 million homes are electrified, while making them more efficient, can play an important role in driving down national emissions. Homes currently produce 10% of our carbon emissions (DCCEEW 2023a).

At the same time, with levels of inflation not seen since the 1970s, the cost of living is heavily impacting household budgets. Energy costs, alongside housing, education and food, are direct contributors. Gas and coal are not only harmful fossil fuels, they are driving up energy costs. Households use gas to heat, cool, and cook in their homes and in certain states, coal fired power is the primary source of electricity.

Gas and coal prices have surged in recent months due to the international energy supply crunch, precipitated by the war in Ukraine and the global economy emerging from the COVID-19 pandemic.

Moreover, the average energy efficiency of Australian homes is among the worst out of rich countries globally. We use too much energy and gain too little when powering our homes. This results in homes that are expensive to run, as well as often being uncomfortably hot or cold to live in (Climate Council 2022a).

However, we can tackle both the climate and cost of living challenges simultaneously in the best two-for-one deal Australians will ever see.

These moves would be popular. A recent poll on behalf of The Australia Institute found that more than half of Australians (55%) feel optimistic about electrifying homes, while just 13% feel negative. Further, the poll also found that people were more optimistic about electric appliances over gas specifically (TAI 2023).

Yet there are barriers to electrifying homes and improving their energy efficiency at the speed and scale we need to see now. For the Committee's consideration, this submission canvasses several practical policy options to overcome these, drawing on Climate Council's work on home electrification and energy efficiency. Electrification and energy efficiency should be considered side-by-side because together, they unlock the greatest benefits for Australians.

This is an exciting time. By electrifying our homes and improving their efficiency, we can lower energy bills and emissions whilst smoothing Australia's pathway to a grid powered by more renewable wind and solar energy (Climate Council 2023b).

We thank the Committee for the opportunity to provide this submission and would welcome the opportunity to discuss its contents with you further.

Summary of recommendations

In this submission, Climate Council has discussed a range of opportunities to advance the electrification of Australian homes while also improving their energy efficiency. A summary of our recommendations is provided below; further analysis providing the rationale for these is provided throughout the body of the submission.

Recommendation 1: Support Australians to electrify and upgrade the energy efficiency of their homes with zero-interest loans and direct upgrades for low-income households

The federal government should enable Australian households to electrify by matching the size and scope of the Household Energy Upgrade Fund to the scale of the upgrade task ahead of us. More than five million homes are still connected to the gas network. Given the number of households needing to get off gas and electrify, the current scale of funding available will not meet the need. State and Territory Governments should match financial contributions and coordinate delivery to achieve maximum speed and effectiveness in the roll-out.

Additionally, governments should directly upgrade the homes of the most vulnerable Australians to be all-electric. There would be significant cost, comfort, health and emissions reduction benefits associated with ensuring all of Australia's 425,000 public, social and Indigenous community homes can run on clean and cheap electricity.

Recommendation 2: Prioritise electrification and energy performance when building and upgrading homes

We need to ensure that best practice applies to new homes when they are built, avoiding the need upgrade them later. To improve the energy performance of new homes and deliver cheaper bills for households from the first day they connect to the grid, the National Construction Code should be updated to require new residential properties to be all-electric. This should include 'knock down, rebuild' re-developments on existing blocks, as well as in new greenfields suburbs.

Recommendation 3: Require the replacement of gas appliances with more efficient electric alternatives from 2025

In addition to ending gas connections for new homes, we should seek to ensure that gas appliances in existing homes are replaced with cheaper, cleaner electric alternatives when they reach the end of their working life.

Individual states and territories could require replacement with electric appliances within their own jurisdictions, but there is also the opportunity to coordinate a national approach. Getting this policy in place as soon as possible is important because household appliances can have a lifespan of more than a

decade, so every gas cooktop or hot water service sold today will likely stay in service well into the 2030s.

Recommendation 4: Plan for wide-scale electrification of households in designing and delivering our future energy system

Australia is aiming for 82% of its electricity to be generated from renewable sources by 2030. We know that residential electrification will increase supply needs at different times of day, the direction of supply from the grid as well as the location of transmission and power generation. This will impact domestic energy security and household energy independence, import considerations for the national grid. Therefore, this work needs to be informed by a national, coordinated plan for transitioning households so that regulators, investors and planners understand precisely how much clean energy supply we will need and where.

Recommendation 5: Implement and coordinate minimum energy efficiency standards for rental properties

Minimum energy efficiency standards for rentals are needed for all states and territories so that everyone has a home that is liveable, safe and affordable to run. In 2023, the ACT is incorporating a new requirement for all rental properties to have ceiling insulation that meets a minimum standard of thermal efficiency. These kinds of requirements should be standardised and made mandatory for rental properties across Australia so everyone can share the benefits of better energy performance.

Recommendation 6: Set clear targets for energy efficiency to drive demand reduction

Climate Council recommends that all levels of Australian government collaborate to develop a well-designed and coordinated system of energy efficiency targets that reduce demand. This will provide a clear signal to energy providers and Australian households about the importance of improving how we use electricity as we electrify everything.

Recommendation 7: Disclose energy efficiency ratings when selling properties

Disclosing the energy performance of a home means that buyers know what they are purchasing at the time of sale. Making that information more visible empowers Australians to make better decisions and avoids saddling people with higher running costs for a home with poor energy performance.

A coordinated, national approach that requires disclosure of energy efficiency ratings during property sales would help kickstart a wave of further investment in energy performance upgrades and retrofits for existing homes around Australia.

Recommendation 8: Partner with building industry peak bodies, unions and trades associations to educate retailers, tradespeople and installers about great all-electric alternatives to gas appliances.

There is an opportunity to train workers in the building and servicing of all-electric homes so tradespeople and installers know about all-electric alternatives. This could be facilitated through the New Energy Apprenticeships Initiative, as well as being directed by peak bodies, unions and trade associations.

In particular, courses should be provided by education providers to upskill workers on how to shift away from gas and micro-credentials offered through the National Skills Agreement.

Glossary

Electrification: Increasing the use of electricity - whether from solar panels or the public grid - as the primary power source to the home. Australian homes are powered by electricity and other fuel sources like gas. Electrification would replace gas appliances like heaters, hot water systems and cooktops with electric alternatives.

Thermal efficiency: The ability of a building to stay cool in summer or retain warmth in winter. Buildings with good thermal efficiency require less energy to heat or cool.

Energy performance: Good energy performance uses the cleanest and most affordable power source - renewable electricity - most efficiently. This is achieved through electrification, thermal efficiency upgrades, and using energy wisely, like during off-peak periods.

Peak demand: Energy networks are designed and built to meet our highest total energy consumption. Typically, this is on hot summer days in Australia when air-conditioning is high. Most of the time, demand is lower, and the distribution network needs to be used to its total capacity. Reducing peak demand can mean we can invest less infrastructure, which puts downward pressure on power prices. Wholesale electricity prices are also highest when demand is high, so reducing these peaks will help reduce prices.

1. The opportunities for electrification and energy efficiency

Electrification

As the demand for solutions to the climate and cost of living crises continues to grow, residential electrification presents a significant pathway to reduce energy consumption, greenhouse gas emissions and power prices for households. Technology is readily available now to update how we heat our homes, cook our meals and source hot water. From highly efficient heat pumps in air conditioning units that offer reliable heating and cooling to induction cooktops improving the way we cook, Australians can share in the benefits right now.

Heat pumps

Heating and cooling consume the most energy in Australian households, accounting for approximately 20-50% of total energy usage depending on region (DCCEEW 2023b). Gas heaters are commonly used to keep warm during winter in colder regions like Tasmania, Victoria and the Australian Capital Territory.

However, heat pumps offer a more efficient means of heating or cooling for water, air, and some industrial purposes. Heat pumps source energy from the surrounding environment, such as the air, ground, or water, rather than using fuel or electricity to heat a coil. They can operate in both high and low outdoor temperatures.

The everyday reverse-cycle air conditioner is an example of a heat pump. An electric motor drives a compressor to concentrate heat from the outside air, which is then expelled into the room. When cooling, the system works in reverse. Water heat pumps operate similarly, harvesting heat energy from the air to heat water.

Efficient reverse-cycle air conditioners are less expensive and produce fewer emissions than other heating options. On average by switching from a gas heater to one of these heaters, households can save \$338 a year (Climate Council 2022b).

Induction cooktops

An induction cooktop is a stove that uses electromagnetic energy to heat pots and pans directly. Unlike traditional gas or electric cooktops, which heat the cookware indirectly by applying a flame or electrical heating element to the bottom of the pot or pan, with induction cooktops the pot or pan effectively acts as the heating element itself, meaning much less heat is wasted.

Over the years, the cost of induction cooktops has decreased significantly since their introduction as new technology. Many models and price points are available, making them suitable for every household.

Water heating

Heating water for hot showers and cleaning clothes accounts for around a quarter of the energy used in our homes. Gas hot water systems are a standard fixture in many Australian homes because these used to be the cheapest available technology.

However, electric heat pumps are now a cleaner and more affordable technology for water heating. These hot water systems draw in heat from the air to heat water, stored in a tank. They are more efficient than traditional instant gas hot water systems, and can save households \$437 per year once they make the switch (Climate Council 2023b).

Energy efficiency

Electrification is one aspect of improving energy performance and driving Australia's clean energy transition, and must be paired with improvements in energy efficiency. Without accompanying efficiency measures, shifting from gas to electricity will increase overall demand for electricity and thereby the amount of new generating capacity, storage and transmission infrastructure that needs to be built. Therefore, energy efficiency is important not only in reducing power bills and emissions, but in ensuring Australia's energy transition is more manageable.

Improving energy efficiency involves reducing the demand for power in homes by implementing practical solutions such as identifying and addressing draughts, adding insulation, and adopting LED lighting. By doing so, we can limit the rise in electricity demand, mitigating the need for infrastructure expansion, which will also help keep household power bills down.

Finding and fixing draughts

Reducing the amount of hot or cold air that moves in and out of homes and the circulation between spaces in walls, floors, and roofs can make a big difference in how much energy is needed to keep homes comfortable. There are various measures available, including sealing underneath doors and wall cavities and reducing sub-floor ventilation.

However, proper ventilation is essential for indoor air quality, particularly after draught sealing. Opening windows is an easy way to reduce condensation and regulate indoor temperature when the weather permits.

Insulation

Household insulation refers to the materials used in construction to reduce the heat transfer rate into or out of a building. This can keep a house warm in the winter by reducing the amount of heat that escapes and cool in the summer by reducing the amount of heat that enters.

Most insulation material works by trapping tiny pockets of air, which is a poor conductor of heat. This slows the movement of heat through the insulation material, making it more difficult for heat to enter or leave the building.

Insulation is measured by an R-value - a measure of the insulation material's resistance to heat flow, known as 'thermal resistance'. Higher R values mean higher resistance to heat transfer and, therefore, better insulating effect and subsequent energy savings.

Other measures

In addition to thermal efficiency measures, there are many other simple options for improving home energy efficiency. For example, a low-flow shower head reduces water use; and, thereby, the need and expense of heating water. Studies have shown that households can recoup the money spent on buying a low-flow showerhead via energy bill savings in less than a year (Sustainability Victoria 2015).

Windows can be a source of heat loss. Window dressings, glazing, films, and Low-E glass can be used to reduce loss and improve the thermal efficiency of homes. Roofs, too, can be coloured and shaded for efficiency.

Similarly, lighting homes can make up roughly 10 percent of total electricity bills. This energy use can be slashed by up to 80 percent by switching halogens for LEDs (light-emitting diodes) (DCCEEW 2023c).

2. The benefits of electrification and improving energy efficiency

Australian households meet their energy needs by combining different fuel sources, with piped gas accounting for almost 40%. More than five million Australian homes are connected to a gas network (Energy Networks Australia 2021).

These households are exposed to volatile fluctuations in the international gas market. The wholesale price of gas has almost tripled between 2020-21 and 2021-22 (See Figure 1) due to supply constraints precipitated by the war in Ukraine and a harsh European winter.

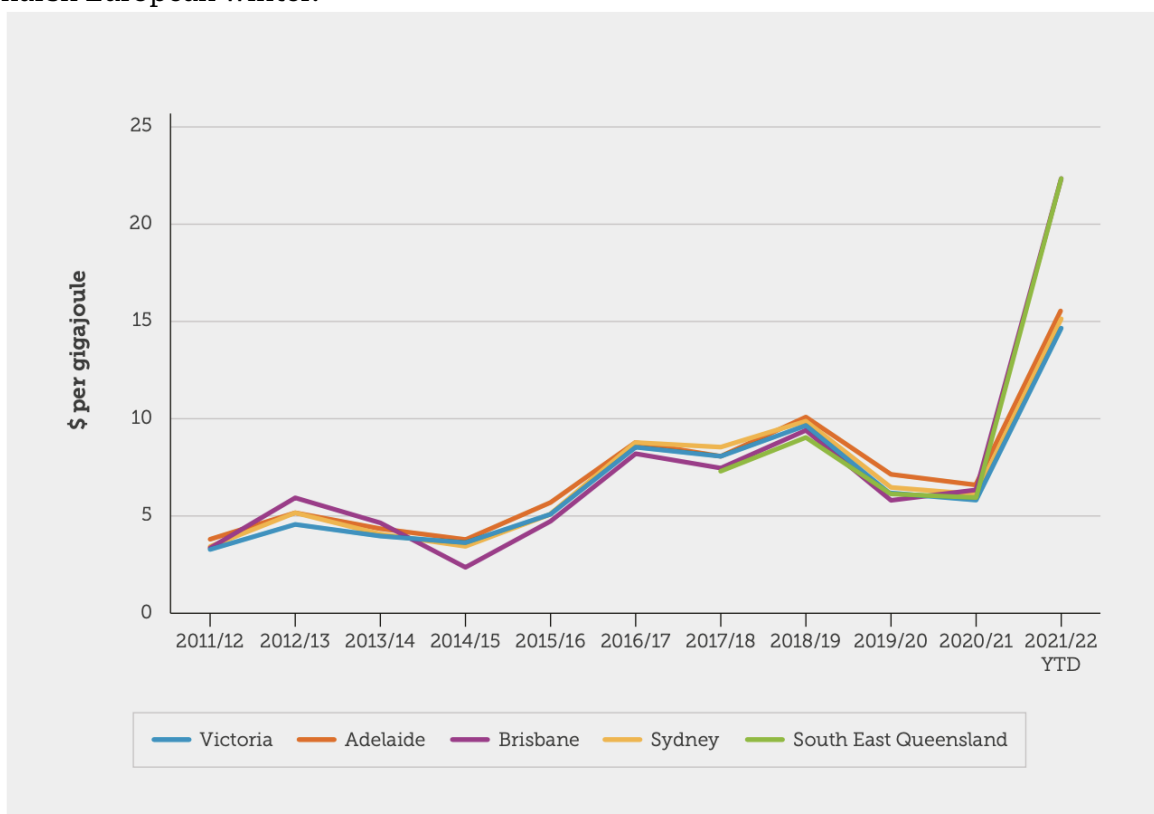


Figure 1: Gas market prices in Victoria, Adelaide, Brisbane, Sydney and South East Queensland, 2011/12 to 2021/22 (Source: Australian Energy Regulator, 2022.)

In addition to this, too many Aussie homes rate poorly on energy performance, using more energy than necessary. From October 2023, the minimum energy standard for new homes will be 7-Stars but homes built before 2003 were constructed without any minimum standard (Hurlimann et al. 2018; Moore et al. 2019). They are more expensive to run and unnecessarily add to our climate challenge.

In 2022 Australia was rated eighteen out of twenty-five on the International Energy Efficiency Scorecard (ACEEE 2022) behind India, the United States and Mexico. We can do better. Australian households will share in a range of benefits if we pursue a wide-scale national push towards electrification.

Cost savings

By switching to modern electrical appliances in the home, Australians can save. Gas heaters, cooking appliances and hot water systems are almost always more expensive than the current smart, electric alternatives. Electric appliances are more efficient and skip expensive gas as a fuel source.

Electrical appliances are more efficient because electric appliances generally use less energy to do the same job. Efficiency is measured using the 'Coefficient of Performance'. For gas appliances, the Coefficient of Performance is generally 1. For every unit of energy in the gas used, only 1 unit of heat can be produced. The Coefficient of Performance for an electric heat pump can be between 3 and 6 units (Climate Council 2023b).

The benefits of switching are considerable, especially when combined with energy efficiency measures like sealing draughts, LED lighting, insulation, and secondary glazing. **Climate Council analysis has shown that families can save between \$1,119 and \$2,872 a year compared to those using gas appliances and living in homes with poor energy performance** (Climate Council 2023b).¹

Notably, households in inefficient homes will experience cost-saving benefits no matter which measures they choose to start with, and these savings only grow as more measures are taken to improve home energy performance.

Emissions reduction

In addition to substantially lowering household energy bills, switching from gas - a polluting fossil fuel - and improving energy efficiency will also reduce greenhouse gas emissions.

Climate Council analysis has shown that households can cut an average of 37.5 tonnes of harmful carbon pollution over a decade by implementing electrification and energy efficiency measures. These emissions cuts could take pressure off harder-to-abate sectors like manufacturing and agriculture (Climate Council 2023b).

The amount of emissions produced by electrical appliances naturally depends on the emissions intensity of our electricity grid. Electrical appliances will become less emissions-intensive as we continue to transition our electricity grid to renewables, like solar and wind. In contrast, gas appliances will always produce emissions while in use.

Take Tasmania, which has been powered by 100% renewable energy since 2020; emissions associated with using electric appliances are comparatively lower than in other non-renewable power jurisdictions (Electricity Maps 2023).

¹ The cost savings from gas to electricity will vary depending on whether a household uses bottled gas (LPG) or gas piped to the household via the local network. In all states and territories, the majority of gas is piped. This includes Victoria, where gas makes up a significant portion of overall household energy use due to the early exploitation of gas nearby in the Bass Strait. However, in Queensland - where gas only makes up a small portion of household energy use - a lot of the gas is bottled. This calculation is based on piped gas only.

Decentralising energy and boosting renewables

Electrification, coupled with energy efficiency, is fundamental to achieving a future of clean energy and net zero emissions. Working in tandem they will drive down the cost of electricity and emissions for households but also reduce the need for energy system upgrades.

Currently, the costs of upgrading, maintaining and installing gas network assets get passed on through retailers to consumers in the form of supply charges and usage charges. These charges can make up to forty to fifty per cent of a household bill (ACCC 2021). Hence, reducing the need for energy infrastructure is a critical factor in keeping bills as low as possible.

Being smarter with how we use energy can reduce demand on our grid at certain times and the additional need for expensive upgrades. The Australian Sustainable Built Environment Council and ClimateWorks (2018) have looked at how much can be saved in new network build costs simply by improving energy efficiency.

They found that for every one-kilowatt reduction in peak demand due to energy efficiency measures - equivalent to around half the amount of power a kettle uses - there are just under \$1,000 in saved network costs.

Analysis commissioned by the ACT Government has also drawn similar conclusions. Electrification and energy efficiency measures were estimated to collectively deliver community benefits worth \$2.3 billion - far outweighing the costs of the change itself at \$1.5 billion (GHD and ACIL Allen 2022).

Looking overseas, a pertinent example can be found in the US Pacific Northwest. The Northwest Power and Conservation Council has estimated that efficiency measures between 1980 and 2020 helped avoid the need to build 7,500 megawatts of new generating capacity. This resulted in significant cost savings and improved the grid's reliability and emissions intensity (NPCC 2021).

The ongoing debate surrounding the build-out of transmission infrastructure has brought to light several crucial considerations: the substantial costs involved, the time it takes for implementation, and the social license required for such large-scale projects. By capitalising on the opportunity that energy efficiency and electrification present, we have the potential to limit the need for extensive transmission build-outs. This can be further reduced by shifting our focus towards decentralised, local energy generation and consumption.

A real world international example can be found in the Brooklyn-Queens Demand Management program, delivered in the United States of America. This initiative by Consolidated Edison (Con Edison 2023) involved targeted demand reduction and energy efficiency measures to alleviate the need for a new power substation in the Brooklyn-Queens area of New York City. By implementing energy efficiency programs, distributed generation, and demand response initiatives, Con Edison was able to defer the construction of a new substation, saving significant costs and reducing the strain on the local transmission network whilst rewarding households that participated.

Manufacturing and jobs

Helping households go all-electric will not just save families money on power bills. This switch can also create great jobs by encouraging local manufacturing of essential products like heat pumps, solar panels and batteries.

Australia is rich in many raw materials for manufacturing the components of an all-electric home. For example, manufacturing heat pumps calls for large quantities of copper and aluminium - two minerals that Australia has more of than almost every other country in the world.

Rather than sending our minerals offshore as lower-value raw materials, there is a huge opportunity to boost processing and advanced manufacturing at home. One analysis forecast global heat pump demand to hit 450 million units by 2030, doubling the number sold in 2022 (Rystad Energy 2022). This could rise as high as 1.5 billion units by 2050, contributing to a new clean manufacturing jobs boom as the world decarbonises.

The US is working to capture this opportunity through the Inflation Reduction Act 2023 (IRA). The IRA funnels over AUD\$520 Billion into developing, manufacturing and deploying clean technologies. As of April 2023, 46 new manufacturing facilities have been announced, and nearly 20,000 have been created (American Clean Power 2023).

Europe has also responded to the opportunity with the European Green Deal Industrial Plan. Part of this includes enacting the Net-Zero Industry Act and Critical Raw Minerals Act alongside substantial clean technology investment. The Net Zero Industry Act in particular simplifies the regulatory framework for the manufacturing of clean technologies.

The European Union projects that the Act will triple the manufacture of vital clean technologies. In the case of electric heat pumps, it aims to drive a sixteen-fold increase in deployment. The EU has mandated that strategic net-zero technologies - like batteries, fuel cells, off and onshore renewables - make up forty percent of their energy needs by 2030 (EUC 2023).

Notably, the Australian Government has indicated it is developing a response to the IRA. This response must have the size and scale needed to reach net zero emissions by 2035 and prevent the off-shoring of our manufacturing capacity to the EU and US. For example, Andrew Forrest, Executive Chairman of Fortescue Future Industries, recently announced the decision to build a battery-making hub in the United States, and said this was “absolutely IRA driven.” Examples like this should serve as a warning to decision-makers about the importance of getting Australia’s policy settings right (Leeuwen 2023).

Governments should coordinate this investment to ensure there is focused support for local manufacturing businesses to start up and scale up to meet Australia’s - and the world’s - demand for more electric household appliances.

3. The barriers to electrification and energy efficiency

The benefits for households are well established, but barriers to adoption and implementation must be overcome. Thankfully, with innovative policies, they can be.

Upfront purchase price

First, replacing gas, water, room heating and cooking appliances with electric alternatives can cost upwards of \$7,800 depending on the chosen brand, model, and installation costs (Climate Council 2022b). It should be noted that not all households will need to replace all of these appliances as many already use a mix of gas and electric options.

Government incentives can play an essential role in removing this cost barrier. Low- and zero-interest loan schemes can be beneficial because they address households' upfront purchase and installation costs and are more affordable for governments to provide at scale than direct grants.

The 2023-24 Commonwealth Budget delivered an initial investment in household electrification. \$1 billion has been allocated to the Clean Energy Finance Corporation for the 'Household Energy Upgrades Fund,' and another \$300 million has been set aside for electrification and energy efficiency in social housing (CEFC 2023). This is a positive starting point but the scale of the investment does not yet match the scale of the electrification task ahead of us.

In rolling out the Household Energy Upgrades Fund, the Commonwealth and CEFC should look to the Australian Capital Territory Government, which has established the successful 'Sustainable Household Scheme' (ACT Government 2023). The Sustainable Household Scheme provides zero-interest loans of up to \$15,000 for home upgrades with up to 10 years to repay the loans for solar installations.

This Scheme has slashed bills for thousands of households across the Territory. Combined with the fact that the Territory is powered by 100% renewable energy, participating households have been effectively insulated from fluctuations in the international energy market.

This is on top of the 'Home Energy Support Program,' which disburses \$50 million for improving energy efficiency for social and public housing, low-income owner occupiers and low-performing rental properties. This follows a first-of-its-kind law that bans gas in new homes and businesses (ACT Government 2022).

These policies are impactful, but we must build on these in successive budgets. Rewire Australia's (2021) analysis suggests it will require up to \$12 billion to electrify Australian households but will also unlock \$300 billion in savings by 2035. The Climate Council has prepared a dedicated guide on how [concessional financing can help reduce emissions](#).

New and replacement home construction and appliance choice

Currently over 240,000 homes are under construction (ABS 2023), and many of them are being equipped with gas connections. Additionally, for most existing homes, there is no obligation to replace gas appliances with electrical ones when they reach

the end of their life, often leading to the installation of new gas appliances when replacements are necessary.

This approach poses challenges because retrofitting homes to be all-electric is more complicated than starting afresh. To address this issue, it is essential to ban new gas connections while also implementing supportive programs to remove existing connections.

Electrifying these homes will require significant policy efforts, but it is achievable. Positively, some states in Australia, such as Victoria, are taking steps to remove mandatory gas connections and promote the use of efficient electric appliances through initiatives like the Victorian Energy Upgrades program.

The ACT has again led the way for other jurisdictions to follow. In 2023 the ACT Parliament passed legislation to ban new gas connections in new dwellings with the aim of turning off gas in the Territory by 2045. This is a significant move as gas accounts for twenty percent of emissions in that jurisdiction. Following this, the Victorian Government recently updated their policy to ban new connections in homes.

Overseas, the European Union provides a strong example of what's possible. In the European Union, all new buildings must be Net-Zero by 2028 and the entire housing stock by 2050. On top of this, the European Union Commission has developed a 'Renovation Wave Strategy' to improve the energy performance of existing buildings. The Commission aims to renovate thirty million buildings and create 160,000 jobs by 2030, showing that action is also a boon for employment (EC 2020).

Gas disconnection fees

Unfortunately, it's not just the cost of buying electric appliances that can be a barrier for Australian households. Disconnecting homes from the gas network can also be expensive and time-consuming, as companies do not make it easy.

The Australian Energy Regulator (AER) has found that some households are opting simply to close off the supply of gas at the meter rather than paying for permanently abolishing the connection by removing network assets and disconnection from the mains. In Australia, gas disconnection rates are determined by the AER and happen jurisdictions by jurisdiction and network by network.

In Victoria, where residential gas use is higher than other states, the AER has decided to set a cost for disconnection at \$220 per household for three distribution networks. This is on top of the tariffs already levelled on all gas consumers (AER 2023). This charge is unreasonably expensive and needs to be reconsidered, especially as that amount could be spent on home electrification or energy efficiency measures.

Moreover, efforts to disconnect homes from gas networks must be strategically coordinated. Sporadic interventions across different jurisdictions risk inefficiency and may lead to equity concerns among Australian households. It would be more effective if such an effort is managed at the federal level, in collaboration with utilities, regulators, and state and territory governments.

People-powered initiatives like Totally Renewable Yackandandah (2023) – which has transitioned the Yackandandah community to 100% renewable energy - show what is possible when communities come together. Utility companies and governments can help get more projects like this get underway.

Access for renters

Renters comprise one in three Australian households, often live in houses with very poor energy performance, and need a better deal. They are often unable to make changes to homes because they do not own them and are more likely to be on lower incomes relative to homeowners.

Renters spend more of their income on energy bills than owner-occupiers (Healthy Homes for Renters 2022). For example, research by Choice (2021) found that less than half of rental properties are insulated. We can do better.

Further, research has shown that areas with lower average incomes and those dominated by rental properties were less likely to take advantage of energy efficiency upgrade incentives (Willand et al., 2020) This highlights the need for mandatory minimum standards for rentals and targeted assistance with efficiency upgrades to ensure all homeowners and renters can benefit.

For an example of this in practice, in 2023, the ACT has incorporated a new requirement for all rental properties, in the Residential Tenancies Legislation Amendment Act 2023. This aims to ensure rental properties have ceiling insulation that meets a minimum standard of thermal efficiency.

A lack of market signals rewarding good energy performance

Promoting energy efficiency in our homes is crucial for achieving our climate and cost of living goals. By sending clear market signals that emphasise the benefits of energy-efficient upgrades, we can incentivise homeowners and property owners to invest in electrification and efficiency improvements.

Implementing energy performance disclosure at the point of sale further reinforces the importance of energy efficiency. This transparency empowers buyers to make informed decisions about a property's energy efficiency, allowing them to consider long-term energy savings as a significant factor in their purchase. As a result, energy efficiency targets become more attainable and realistic as the demand for energy-efficient homes increases. By combining these approaches, we can create a virtuous cycle where the market rewards energy-efficient properties, encouraging further investments in electrification and efficiency upgrades.

Energy efficiency targets have worked well in the EU to send strong market signals. Initially, the EU set a 2020 target to improve energy efficiency by 20 per cent. Having achieved that, in 2022, the European Parliament agreed to update their targets to at least 39% for final energy consumption by households under the 'REpowerEU Plan', which aims to improve their energy independence and security (EC 2022).

The EU has also introduced the Energy Performance of Buildings Directive (EPBD), which requires member states to establish energy performance certificates (EPCs) for buildings. EPCs provide information on a building's energy efficiency, including its energy consumption and potential for improvement. These certificates are mandatory for most buildings when constructed, sold, or rented (EUC 2021). By requiring energy performance certificates (EPCs) for most types of buildings, the directive seeks to increase transparency and awareness regarding the energy efficiency of buildings.

These are strong examples we can learn from in Australia.

Education and awareness

In Australia, the benefits of clean technologies are becoming more widely recognised. However, when it comes to household appliances, many people still choose gas options due to familiarity or need more information about running costs. For example, when replacing a stove, a homeowner may opt for a gas model without considering the benefits of an electric induction cooktop.

To address this issue, education programs could be developed to train installers and tradespeople in working with all-electric homes. The Australian government has already launched initiatives such as the Clean Energy Skills Package, which provides funding for training in clean energy technologies.

The New York State Energy Research and Development Authority provides us with examples of effective programs underway. It offers free courses in partnership with training providers, designed to ensure businesses have a ready supply of workers skilled in energy efficiency and other clean technologies (NYSERDA 2023). California has also been offering extensive training programs through utilities since 2015, with eight Energy Training Centres throughout the state.

Industry associations can also offer training, education and awareness programs. For example, the Sustainable Energy Action Committee in the United States offers the 'Clean Energy Clearinghouse,' which is a series of free educational resources for stakeholders like contractors, suppliers and manufacturers, to learn about household electrification and energy efficiency measures.

Recommendations

Energy efficiency and electrification in Australian households will make homes more comfortable to live in, cheaper to run and cut emissions. Yet the barriers discussed can make it challenging for Australians to take these steps. The following recommendations will pave the way for widespread adoption. These policies should be considered as a mutually reinforcing holistic package allowing effective and comprehensive action.

Recommendation 1: Support Australians to electrify and upgrade the energy efficiency of their homes with zero-interest loans and direct upgrades for low-income households

The federal government should enable Australian households to electrify by matching the size and scope of the Household Energy Upgrade Fund to the scale of the upgrade task ahead of us. More than five million homes are still connected to the gas network. Given the number of households needing to get off gas and electrify, the current scale of programs funding available will not meet the need. State and Territory Governments should match financial contributions and coordinate delivery to achieve maximum speed and effectiveness in the roll-out.

Additionally, governments should directly upgrade the homes of the most vulnerable Australians to be all-electric. There would be significant cost, comfort, health and emissions reduction benefits associated with ensuring all of Australia's 425,000 public, social and Indigenous community homes can run on clean and cheap electricity.

Recommendation 2: Prioritise electrification and energy performance when building and upgrading homes

We need to ensure that best practice applies to new homes when they are built rather than trying to upgrade them later. To improve the energy performance of new homes and deliver cheaper bills for households from the first day they connect to the grid, the National Construction Code should be updated to require new residential properties to be all-electric. This should include 'knock down, rebuild' re-developments on existing blocks, as well as in new greenfields suburbs.

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In addition to ending gas for new homes, we should seek to ensure that gas appliances in existing homes are replaced with cheaper, cleaner electric alternatives when they reach the end of their working life.

Individual states and territories could require replacement with electric appliances within their own jurisdictions, but there is also the opportunity to coordinate a national approach. Getting this policy in place as soon as possible is

important because household appliances can have a lifespan of more than a decade, so every gas cooktop or hot water service sold today will likely stay in service well into the 2030s.

Recommendation 4: Plan for wide-scale electrification of households in designing and delivering our future energy system

Australia is aiming for 82% of its electricity to be generated from renewable sources by 2030. We know that residential electrification will increase supply needs at different times of day, the direction of supply from the grid as well as the location of transmission and power generation. Therefore, this work needs to be informed by a national, coordinated plan for transitioning households so that regulators, investors and planners understand precisely how much clean energy supply we will need and where.

Recommendation 5: Implement and coordinate minimum energy efficiency standards for rental properties

Minimum energy efficiency standards for rentals are needed for all states and territories so that everyone has a home that is liveable, safe and more affordable. In 2023, the ACT is incorporating a new requirement for all rental properties to have ceiling insulation that meets a minimum standard of thermal efficiency. These requirements should be standardised and made mandatory for rental properties across Australia so everyone can share the benefits of better energy performance.

Recommendation 6: Set clear targets for energy efficiency to drive demand reduction

Climate Council recommends that all levels of Australian government collaborate to develop a well-designed and coordinated system of energy efficiency targets that reduce demand. This will provide a clear signal to energy providers and Australian households about the importance of improving how we use electricity as we electrify everything.

Recommendation 7: Disclose energy efficiency ratings when selling properties

Disclosing the energy performance of a home means that buyers know what they are purchasing at the time of sale. Making that information more visible empowers Australians to make better decisions and avoids saddling people with higher running costs for a home with poor energy performance.

A coordinated, national approach that requires disclosure of energy efficiency ratings during property sales would help kickstart a wave of further investment in energy performance upgrades and retrofits for existing homes around Australia.

Recommendation 8: Partner with building industry peak bodies, unions and trades associations to educate retailers, tradespeople and installers about great all-electric alternatives to gas appliances.

There is an opportunity to train workers in the building and servicing of all-electric homes so tradespeople and installers know about all-electric alternatives. This could be facilitated through the New Energy Apprenticeships Initiative, as well as being directed by peak bodies, unions and trade associations.

In particular, courses should be provided by education providers to upskill workers on how to shift away from gas and micro-credentials offered through the National Skills Agreement.

Conclusion

We are facing an unprecedented dual crisis of escalating climate change threats and escalating cost of living.

By transitioning our homes from reliance on gas to electricity and improving energy efficiency, we can tackle both challenges simultaneously - significantly reducing emissions, mitigating the impacts of inflation and other cost of living pressures on household budgets, and smoothing the transition to a renewable energy grid.

Notably, the Australian community is largely optimistic about this transition, and potential benefits such as stimulating domestic manufacturing and positioning Australia as a clean technology manufacturer and exporter present added incentives.

With thoughtful, well-planned action, we can leverage residential electrification and energy efficiency as powerful tools to address Australia's climate and cost-of-living challenges.

References

- Australian Bureau of Statistics (2023). *Building Activity, Australia*. ABS.
<https://www.abs.gov.au/statistics/industry/building-and-construction/building-activity-australia/mar-2023#data-downloads>
- American Council for an Energy-Efficient Economy (2023). *International Energy Efficiency Scorecard*. ACEEE.
<https://www.aceee.org/international-scorecard>
- American Council for an Energy-Efficient Economy (2023). *State and Local Policy Database - California*. ACEEE.
<https://database.aceee.org/state/california>
- American Clean Power (2023). *Clean Energy Investing in America*. American Clean Power.
https://cleanpower.org/wp-content/uploads/2023/04/ACP_Clean-Energy-Investing-in-America_April-2023.pdf
- Australian Competition and Consumer Commission (2021). *Cost of Supplying Electricity to households at an eight-year low*. ACCC.
<https://www.accc.gov.au/media-release/cost-of-supplying-electricity-to-households-at-an-eight-year-low>
- Australian Capital Territory Government (2022). *Home Energy Support Program*. ACT Government.
<https://www.climatechoices.act.gov.au/policy-programs/home-energy-support-rebates-for-homeowners>
- Australian Capital Territory Government (2023). *Sustainable Household Scheme*. ACT Government.
<https://www.climatechoices.act.gov.au/policy-programs/sustainable-household-scheme>
- Australian Energy Regulator (2023). *AER decision supports Victorian gas consumers in energy transition*. AER
<https://www.aer.gov.au/news-release/aer-decision-supports-victorian-gas-consumers-in-energy-transition#:~:text=Ms%20Savage%20said%20the%20AER,haulage%20tariffs%20which%20are%20spread>
- Australian Financial Review. Leeuwen, H. (2023). *Forrest Poised to Open Battery Making Hub – But in the US*. AFR.
<https://www.afr.com/companies/energy/biden-s-green-bounty-pushes-forrest-to-open-us-battery-making-hub-20230710-p5dn7z>
- Australian Sustainable Built Environment Council and ClimateWorks (2018). *Built to Perform: An Industry Led Pathway to a Zero Carbon Ready Building Code*. ASBEC, ClimateWorks.
https://www.climateworkscentre.org/wp-content/uploads/2018/07/built_2_perform.pdf
- Clean Energy Finance Corporation (2023). *Household Energy Upgrade Fund*. CEFC.
<https://www.energy.vic.gov.au/for-households/victorian-energy-upgrades-for-households>
- Climate Council (2021) Steffen W, Hughes L, Bradshaw S, Rice R, Arndt D. *Aim High, Go Fast: Why Emissions Need to Plummet This Decade*. Climate Council.

<https://www.climatecouncil.org.au/resources/net-zero-emissions-plummet-decade/>

Climate Council (2022a). Hutley, Tidemann C. *Tents to Castles: Building Energy Efficient, Cost Saving Aussie Homes*. Climate Council

<https://www.climatecouncil.org.au/resources/tents-castles-building-energy-efficient-cost-saving-aussie-homes/>

Climate Council (2022b). Tidemann C, Rayner J, Cheung H. *Switch and Save: How Gas is Costing Households*. Climate Council.

https://www.climatecouncil.org.au/wp-content/uploads/2022/10/CC_MVSA0323-CC-Report-Switch-and-Save-Gas-vs-Electricity_V6-FA-Screen-Single.pdf

Climate Council (2023a). *Submission to: Setting Tracking and Achieving Australia's Emissions Reduction Targets*. Climate Council.

<https://www.climatecouncil.org.au/resources/submission-to-setting-tracking-and-achieving-australias-emissions-reduction-targets/>

Climate Council (2023b). Tidemann C, Bradshaw S, Rayner J. *Smarter Energy use: How to Cut Energy Bills and Climate Harm*. Climate Council

<https://www.climatecouncil.org.au/resources/smarter-energy-use-how-to-cut-energy-bills-and-climate-harm/>

Con Edison (2023). *Brooklyn Queens Demand Management Demand Response Program*. Con Edison.

<https://www.coned.com/en/business-partners/business-opportunities/brooklyn-queens-demand-management-demand-response-program>

Department of Climate Change, Energy, the Environment and Water (2022). *Australia's Emissions Projections, December 2022*. DCCEEW

<https://www.dcceew.gov.au/sites/default/files/documents/australias-emissions-projections-2022.pdf>

Department of Climate Change, Energy, the Environment and Water (2023b). *Heating and cooling*. DCCEEW. <https://www.energy.gov.au/households/heating-and-cooling>.

Department of Climate Change, Energy, the Environment and Water (2023a). *Residential buildings*. DCCEEW

<https://www.energy.gov.au/government-priorities/buildings/residential-buildings>.

Department of Climate Change, Energy, the Environment and Water (2023c). *Lighting*. DCCEEW. <https://www.yourhome.gov.au/energy/lighting>.

Department of Energy, Environment and Climate Action (2023). *Victorian Energy Upgrades for Households*. DEECA.

<https://www.energy.vic.gov.au/for-households/victorian-energy-upgrades-for-households>

Electricity Maps (2023). *Tasmania*. Electricity Maps.

<https://app.electricitymaps.com/zone/AU-TAS>

Energy Networks Australia (2021). *Reliable and clean gas for Australian homes*. Energy Networks Australia.

<https://www.energynetworks.com.au/resources/fact-sheets/reliable-and-clean-gas-for-australian-homes-2/>

European Commission (2020). *Renovation Wave*. EC

https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en

European Commission (2023). *Energy Efficiency Directive*. EC

https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

European Commission (2023). *Net Zero Industry Act: Make the EU the home of clean technologies manufacturing and green jobs*. EC.

https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan/net-zero-industry-act_en

Healthy Homes for Renters (2022). *Community Sector Blueprint: a National Framework for Minimum Energy Efficiency Rental Requirements*. Healthy Home for Renters.

<https://www.healthyhomes.org.au/news/community-sector-blueprint>

Choice (2021). *Renters left to freeze in poorly insulated homes*. Choice.

<https://www.choice.com.au/money/property/renting/articles/renters-left-to-freeze-in-poorlyinsulated-homes>

GHD and ACIL Allen (2022). *Economic and Technical Modelling of the ACT Electricity Network Strategic Report*. GHD and ACIL Allen.

<https://acilallen.com.au/uploads/projects/547/Strategic-Report-pdf.pdf>

Hurlimann, AC., Browne, G., Warren-Myers, G. & Francis, V. (2018). *Barriers to climate change adaptation in the Australian construction industry – impetus for regulatory reform*. Journal of Building and Environment.

<https://minerva-access.unimelb.edu.au/items/c5fe84df-3203-57d8-9abe-42ec7c4b34c2>

Mannheim, M. (2022). *No New Gas Connections for ACT Homes and Businesses from 2023 Under Plan to Phaseout Fossil Fuels*. ABC

<https://www.abc.net.au/news/2022-08-04/act-no-new-gas-connections-from-2023-new-homes/101299552>

Moore, T., Berry, S., & Ambrose, M. (2019). *Aiming for mediocrity: The case of Australian housing thermal performance*. Energy Policy.

<https://doi.org/10.1016/j.enpol.2019.06.017>.

New York State Energy Research and Development Authority (2023). *Example Projects*. NYSERDA.

<https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Workforce-Development-and-Training/Resources/Example-Training-Projects>

Northwest Power and Conservation Council (2021). *Energy Efficiency*. NPCC.

<https://www.nwcouncil.org/energy/energy-topics/energy-efficiency/>

Rewiring Australia (2021). Griffith, S, Ellison J, Calisch S, Cass, D. *Castle & Cars: Savings in the Suburbs Through Electrifying Everything*. Rewiring Australia.

<https://www.rewiringaustralia.org/savings-in-the-suburbs>

Rystad Energy (2022). *Residential heat pump demand to top 1.5 billion units by 2050 on energy efficiency and security concerns if supply can keep up*. Rystad Energy.

<https://ajot.com/news/residential-heat-pump-demand-to-top-1.5-billion-units-by-2050-on-energy-efficiency-and-security-concerns-if-supply-can-keep-up>

Sustainable Energy Action Committee (2023). *Clean Energy Clearinghouse*. SEAC

<https://sustainableenergyaction.org/clean-energy-clearinghouse/>

Sustainability Victoria (2015). *Energy Efficiency Upgrade Potential of Existing Victorian Houses*. Sustainability Victoria.

<https://assets.sustainability.vic.gov.au/susvic/Report-Energy-Energy-Efficiency-Upgrade-Potential-of-Existing-Victorian-Houses-Sep-2016.pdf>

The Australia Institute (2023). *Getting Off Gas: Majority Support Household Electrification as Economic, Climate Concern Costs Rise*. The Australia Institute

<https://australiainstitute.org.au/post/getting-off-gas-majority-support-household-electrification-as-economic-climate-costs-rise/>

Totally Renewable Yackandandah (2023). *Main Page*. Totally Renewable Yackandandah

<https://totallyrenewableyack.org.au/>

Willand, N., Moore, T., Horne, R. & Robertson, S. 2020. *Retrofit Poverty- Socioeconomic Spatial Disparities in Retrofit Subsidies Uptake*. Buildings and Cities.

<http://doi.org/10.5334/bc.13>.