Roadmap for efficient and electric homes:

Making all Australian homes healthy and affordable

About the development of the Roadmap

The Justice and Equity Centre (JEC- formerly PIAC) and the Australian Council of Social Service (ACOSS) initiated the Efficient Electric Homes Collaboration (EEHC) in 2023.

The EEHC is a growing cohort of over 65 organisations (see appendix 1) from across social, energy, climate, local government, health, research and industry sectors who are working towards efficient and electric Australian homes.

The EEHC was brought together to develop a shared understanding of the desired outcomes of efficient and electric homes for organisations in different sectors. The EEHC also works on strategies to achieve these outcomes and defines what will be required from decision-makers and industry. This roadmap has been developed by drawing on the input of the Collaboration and other relevant work in the space.

The JEC led the creation of the Roadmap. The following organisations contributed to its development as participants in the Roadmap steering committee:

- Australian Council of Social Service (ACOSS)
- Australian Sustainable Built Environment Council (ASBEC)
- Climateworks Centre
- Energy Efficiency Council (EEC)
- Friends of the Earth, Melbourne (FoEM)
- Institute for Energy Economics and Financial Analysis
- Renew
- South Australia Council of Social Service (SACOSS)
- Merri-bek City Council

The recommendations expressed in this report do not necessarily reflect all the views of the organisations involved in the Efficient Electric Homes Collaboration or the Roadmap steering committee. Individual organisations will choose to utilise this resource according to their specific needs and priorities.

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1. Introduction

Improving the energy performance of Australian housing through energy efficiency and electrification is necessary for a rapid and equitable transition to a zero-carbon-ready society[1]. People are also struggling with the rising cost of energy and an acute housing affordability crisis, with electrification and home energy efficiency critical parts of the solution.

The International Energy Agency's 'Net Zero by 2050' roadmap highlights improved energy performance and renewable electrification as key pillars of decarbonisation and the global pathway to net zero[2]. Their roadmap is also unequivocal[3] that there can be no new gas fields approved and existing methane production and use needs to be urgently phased out. The International Renewable Energy Agency estimates that electrification and energy performance will deliver 45 percent of global emissions abatement to 2050.[4] Without ambitious and coordinated action to electrify and upgrade home efficiency Australia cannot meet its climate commitments and emissions reduction targets.

Australia is experiencing more extreme weather, our health system is stretched, and large-scale energy projects are struggling with supply chain and workforce challenges. Working towards making all Australian homes efficient and electric is a positive action decision-makers can take to contribute to addressing these issues.

Inaction also risks Australia losing skilled workers and business to countries that are leading us in policy and practice[5].

Household electrification and improved energy efficiency, effectively implemented, enables substantial and wide-ranging benefits, including:

- Significant, permanent household energy savings.
- Government and household savings on health budgets.
- Emissions reductions in homes and the energy system.
- Increased household and community resilience to extreme weather including heatwaves.
- A more flexible, efficient and resilient energy system, achieved through distributed demand response.
- Growth in more sustainable and resilient local manufacturing.

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[1] Zero carbon ready homes have been built or upgraded with the best practice thermal efficiency, all-electric, and powered by renewables

[2] International Energy Agency 2021 Net Zero by 2050: A Roadmap for the Global Energy Sector

[3] International Energy Agency 2021 Net Zero by 2050: A Roadmap for the Global Energy Sector

[4] International Renewable Energy Agency, 2022, World Energy Transition Outlook 2022

[5] ANZ and Energy Efficiency Council, 2023, *Putting Energy Efficiency to Work: the Forgotten Fuel Series*, p.9

- Thousands of new, secure jobs distributed throughout the country.

There has been some inconsistent action to upgrade Australian homes to be efficient and electric. But governments and decision-makers are yet to commit and take the co-ordinated, long-term strategic, and equitable action required. Current regulations, policies, subsidies and programs support continued use of networked fossil gas, undermining scope for progress. This situation endangers our efforts to prevent climate change and reduce the impact of high costs of energy and housing on the community.

Co-ordinated action at all levels of Government is needed through the National Energy Transformation Partnership and similar platforms to ensure consistent and effective decision-making.

The transition to renewable energy and upgrading Australian homes to be efficient and electric will result in more complexity in our energy system. Steps must be taken to ensure this complexity doesn't impact households. Decision-makers must implement regulations and protections for all households on the basis that energy is essential, it must be easy and affordable to access. The costs of change must be allocated equitably and accessing energy should not impose an unreasonable burden on households.

Equity must be a priority to ensure no-one is left behind, and Governments must ensure those who need it most are supported to benefit from the transition.

This Roadmap sets out a comprehensive framework, grounded in robust principles, to implement the ambitious, coordinated actions required.

2. The Roadmap for Efficient and Electric Homes

The roadmap for efficient and electric homes (the roadmap) sets out what action is required from governments and decision-makers to upgrade Australian homes, and how to co-ordinate and prioritise these actions.

The roadmap:

- is informed by an **order of principles** that:
  1. meets our climate commitments;
  2. ensures energy affordability and improved equity; and
  3. embeds health outcomes, climate resilience and energy reliability and security into the ongoing energy transition.

- provides **robust objectives and principles** forming the foundation for optimising the impact of action implementing efficient and electric homes;

- recommends **targets and timelines** for action informed by its objectives and principles;
- outlines **actions required** to acheive efficient and electric homes, identifying priority actions, and signposting where **further work is needed** to resolve more complex aspects of electrification;
- is an **iterative process** that will be **updated** as new research, policies and projects arise, informing and progressing the transition to efficient and electric homes;
- is for **policy makers, regulators, industry leaders and organisations** representing energy users, local communities, and the environment;
- includes recommendations on what is required to **support specific parts of the Australian community** to begin to making their homes efficient and electric; and
- sequences recommendations according to robust principles to optimise impacts and **avoid poor outcomes** for the climate and for households and to **mitigate the risk unintended consequences**.

If implemented together the recommendations made throughout this report would help ensure a rapid and equitable transition of Australian homes and better enable a low or zero-carbon Australia.

2.1 What is not included?

Commercial and Industrial energy performance.

The roadmap is focused on **efficient and electric homes**. Factors which impact this, such as workforce, supply chains and capacity, have been considered in the framing of the roadmap and its recommendations. But commercial and industrial energy performance is outside of the scope of the roadmap and the Efficient Electric Homes Collaboration.

Detailed analysis of what is happening and state and territory level.

We acknowledge that some state and local jurisdictions are currently leading the way on policies, funding and supports for efficient and electric homes. However, all jurisdictions have scope for more consistent, comprehensive and significant action. This roadmap will **not detail the work that is already happening**, as that information is available elsewhere[6] and is likely to change rapidly over time.

Roadmap structure

The use of the term 'Roadmap' reflects this document's intended role in pointing to other resources, reports, and more detailed work that has been done, or is required. It is not intended to be comprehensive in detail on every

[6] Refer to the reference list at the end of this document.

element but to provide broad direction on all aspects of the action required, and be the basis for further iteration.

The Roadmap identifies how different levels of government will need to contribute to the implementation of recommended actions and mechanisms for delivery. For the purposes of this document, 'Commonwealth' refers to both the federal government and national energy market (NEM) bodies. Where actions for NEM bodies are identified, states and territories not covered by the NEM will need to implement comparable actions within their regulatory systems.

The Roadmap contains 5 sections, each representing a different aspect of action required to upgrade Australian homes to be efficient and electric at the scale and speed required for emissions reduction. While many actions will need to occur concurrently, each section seeks to order actions according to priority. The 5 sections are:

- **The three pillars of efficient and electric homes:** This section introduces the 3 core types of upgrades needed for Australian houses: thermal efficiency measures, switching to efficient electric appliances, and access to the benefits of consumer energy resources (CER).
- **Implementing efficient and electric homes:** This section outlines systemic and structural changes governments and regulators need to facilitate efficient and electric homes in Australia. This includes governance, planning, data, planning the retirement of the residential gas network, and reforming standards, laws and regulations.
- **Incentivising and enabling efficient and electric homes:** This section focuses on how decision-makers can help Australian households start creating an efficient and electric home. It includes recommendations on funding and financing as well as detail on how specific disadvantaged cohorts can best be supported.
- **Building supply chains and workforce for efficient and electric homes:** This section outlines the necessary changes to local manufacturing, supply chains and workforce needed to build and upgrade efficient and electric homes.
- **Engaging the community on efficient and electric homes:** This section outlines community engagement and communications needed to support the Australian community to participate in and benefit from the energy transition.

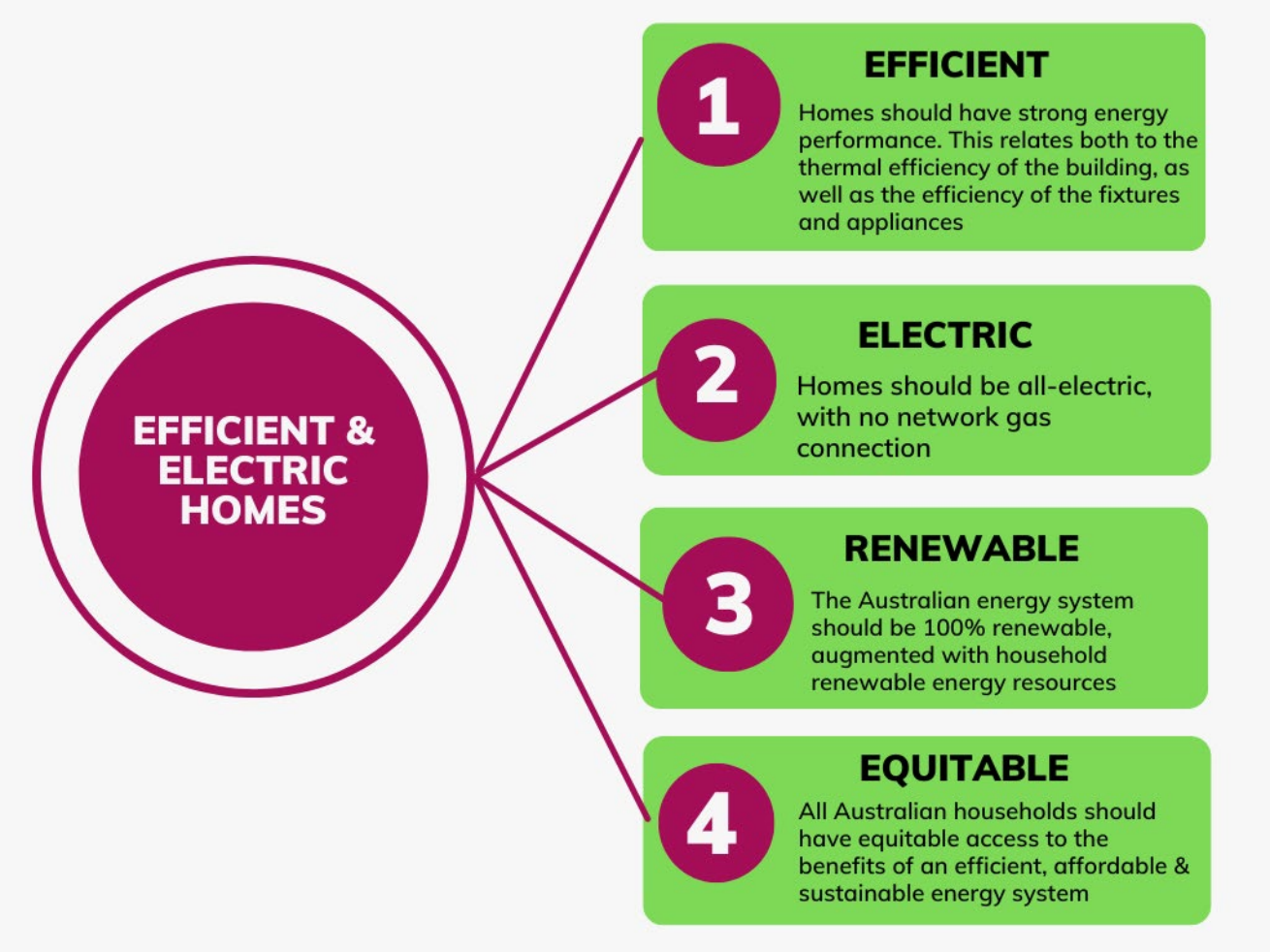
The Roadmap concludes with an extensive list of further resources that provide detailed research on different aspects of upgrading Australian

homes to be efficient and electric, including jurisdiction-specific resources and information.

3. What are Efficient and Electric Homes?

As outlined in figure 1, efficient and electric homes have a thermally efficient building envelope, efficient fixtures and appliances, are all-electric and augmented with renewable energy sources. They are homes fit now, for the future. They are more affordable, sustainable and better able to support the health and well-being of all in the community.

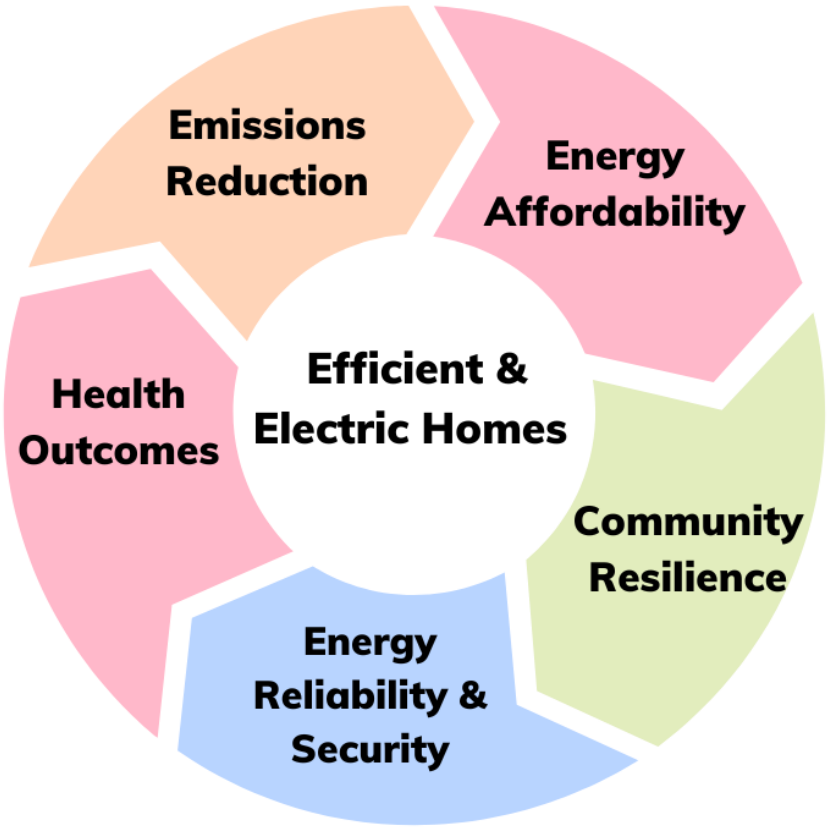
Figure 1 What comprises efficient and electric homes



4. Why efficient and electric homes?

Transforming our homes to be efficient and electric has significant benefits (figure 2). It will provide a crucial contribution to a low cost and fair pathway for decarbonising the energy system. It will also improve long term energy and housing affordability, social equity, health outcomes, and climate resilience.

Figure 2 – Benefits of efficient and electric homes



4.1 Emissions Reduction

The coming decade is critical if we are to meet our international climate commitments[7] and maintain a realistic possibility of limiting temperature increases to below 2 degrees and pursue a limit of 1.5 degrees. Emissions budgets[8] associated with these commitments mean the timeframe for action is not 2050, but what must be done by 2030 and 2035.

Australia's climate and emissions reduction commitments cannot be met affordably, and certainly cannot be met in time, without decommissioning residential gas networks, improving household energy performance and fast-tracking renewable electrification[9]. No credible transition and emissions reduction strategy can exist without a significant contribution from improved energy performance and electrification of our housing stock.

Methane is a dangerous fossil fuel with greater short-term emissions impact on climate change than carbon dioxide. This makes methane critical to staying

[7] Commitments include the *Paris Agreement*, the *Global Renewables and Energy Efficiency Pledge.* and the *Global Methane Pledge*
[8] Climate Change Authority, 2024, 2024 Annual Progress Report
[9] International Energy Agency, 2021, *Net Zero by 2050: A Roadmap for the Global Energy Sector*

within emissions budgets and ensuring climate commitments remain achievable. Fugitive methane emissions are grossly under-reported in Australia[10] resulting in significant underestimates of its impact on emissions reductions efforts. Rapidly eliminating methane emissions is a high impact short-medium term priority for any meaningful emissions reduction response. Its continued domestic production, use and export is incompatible with our global climate responsibilities and harms our health and future prosperity. Reducing domestic fossil gas demand and meeting emissions reduction targets will require electrification of most existing domestic gas use and the managed phase-out of residential gas networks.

More efficient electric homes also reduce the overall energy requirement for households. While fossil generation remains a part of the energy mix, more efficient homes mean lower-emissions homes. By adopting an "efficiency-first principle" and prioritising upgrading Australian homes to be efficient and electric, Australian governments could significantly accelerate the transition. This would also reduce the transmission and generation capacity necessary to achieve our emissions reduction targets.

Such a principle would in turn assist in managing the increasingly apparent risks and costs involved in utility-scale energy transition projects. Further, homes that are efficient and electric can support a faster and cheaper transformation and decarbonisation of Australia's energy system by enabling greater use of flexible loads to optimise and manage demand.

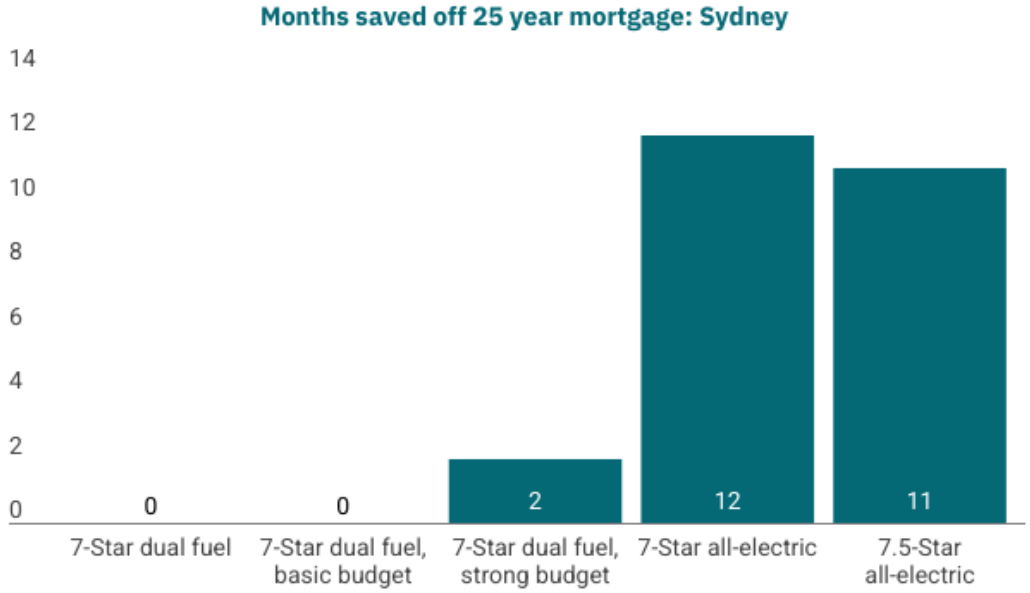
4.2 Energy Affordability

Efficient and electric homes short-term impacts to mitigate the current cost of living crisis, as well as enduring improvements to energy affordability for Australian households, helping to smooth the path of the energy transition.

As an essential service, energy costs have a significant and constant impact on households. Upgrading Australian homes to be efficient and electric is an opportunity for decision-makers to have an enduring impact, improving the affordability of maintaining. As household energy costs lower, they help to offset high mortgage and rent costs, leaving people with improved capacity to meet their other needs.

[10] Institute of Energy Economics and Financial Analysis, 2023, *Gross under-reporting of fugitive methane emissions has big implications for industry*

Figure 3: Analysis from Renew[11] on mortgage offsets from electrification upgrades to the home



An analysis by Renew of costs of dual fuel homes versus all electric homes found that annual energy bills in 2024 would rise by $1231- $1939 for homes still using gas, but significant savings are made when homes were converted to all electric Western Sydney spent approx. $2900 less a year in 2022[12]. Even compared to the most efficient dual-fuel home possible, a 7-star fully electric home with solar would still spend approx. $1200 less a year. A significant factor in these savings is removing the ongoing fixed cost of maintaining a gas connection, as well as savings related to the increasing gap between the efficiency of gas appliances and more efficient electric ones (such as heat-pump hot water systems and reverse-cycle air-conditioners.)

Figure 3 also shows savings that can be made to mortgage with all electric homes.

These savings do not include the impact of new energy products enabling all-electric homes (even those without their own solar) to benefit from cheap/free solar energy in the middle of the day, or services which benefit all-electric homes by shifting demand. Innovative products that maximise times of high solar feed-in to provide cheaper energy will increasingly be offered by energy providers. These types of products and tariffs will have the most potential to benefit all-electric households and if implemented well, are a crucial consideration in improving affordability for homes without access to solar.

[11] Renew, 2021, *Households Better off* p.25
[12] Renew, 2022, *Limiting Energy Bills by Getting off Gas* p.20

4.3 Health

Methane is harmful to human health, directly and when combusted. Pollutants from gas appliances reduce indoor air quality in homes, both when gas is burned and through leakage[13]. Household gas use is increasingly being linked to poor health outcomes including childhood asthma and certain cancers. Cooking with gas is estimated to be responsible for up to 12% of childhood asthma in Australia[14] and a global meta-analysis of asthma risk data suggests a 42% increase in asthma as a result of cooking with gas.[15]

Asthma Australia explains,

> Cooking with gas is a significant source of household air pollution. Gas cooktops produce a variety of air pollutants, including fine particulate matter, nitrogen dioxide, carbon monoxide, and formaldehyde. Similarly, gas heaters produce a variety of harmful air pollutants, and unflued gas heaters are particularly dangerous because these pollutants remain inside the home rather than being vented outside. Exposure to the pollutants produced by gas cooktops and heaters can trigger asthma flare-ups and contribute to the development of asthma. Cooking with gas is estimated to be responsible for up to 12% of the childhood asthma burden in Australia.[16]

Efficiently electrifying Australian homes is the best approach to addressing adverse health outcomes. Converting reticulated gas networks to 'renewable gases' such as bio-methane, does not address the health and safety issues with indoor gas use as biomethane is still methane.

Phasing out the use of gas in Australian homes through efficient electrification will also reduce personal and government health spending and improve household productivity.

Doctors for the Environment Australia recommend that,

> A harm minimisation approach for the 5 million Australian homes with gas appliances requires public education about improving ventilation whenever a gas appliance is used, and phasing out the use of indoor gas appliances. A first practical step is to prevent new homes from being connected to reticulated gas to stop making the problem bigger.

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[13] Ewald, Crisp & Carey, 2022, "Health risks from indoor gas appliances", in the Australian Journal of General Practice

[14] Knibbs, Woldeyohannes, Marks, Cowie. 2018 Damp housing, gas stoves and the burden of childhood asthma in Australia

[15] Lin, Brunekreef & Gehring, 2013, Meta-analysis of the effects of indoor nitrogen dioxide and gas cooking on asthma and wheeze in children

[16] Asthma Australia, 2023, Inquiry into Residential Electrification: Senate Standing Committee on Economics, p.4

> Just as building standards specify health based minimum requirements for sanitation, ventilation, and lighting there are strong health arguments for not permitting indoor gas combustion in future dwellings.[17]

Thermal efficiency is also critical to mitigating cold and heat related illness. More people die from heatwaves in Australia than any other natural disasters. Research by Sustainability Victoria into the impact of energy efficiency and thermal comfort home upgrades demonstrated both improved quality of life and healthcare system cost savings[18] even from relatively simple interventions.

4.4 Community Resilience

More efficient and electric homes, with more flexible demand, are a key contributor to improved household and community resilience to the impacts of climate change. Australians living in inefficient homes with inefficient appliances are constantly faced with a decision of whether to live in unhealthy temperatures and save on their energy bills or maintain a healthy temperature in their home or accumulate unaffordable energy bills.

For many disadvantaged households, even this decision is out of the question, as they are without the means or agency to maintain a healthy household environment at all.

Climate change means we will continue to see more extreme temperatures and humidity[19] as well as more extreme weather events which disrupt electricity services. Australian households need to be able to weather these events safely in their homes. Homes with better thermal efficiency are more resilient against extreme temperatures, and during power outages. Additionally, households with electrified loads present more options for more resilient energy services. Both through scope for more onsite assets to 'ride through' interruptions that may affect the network, and the employment of community microgrids and stand-alone-power systems. Electrified households may also be more amenable to support and restore services through portable energy solutions (such as solar, batteries and generators).

4.5 Energy Reliability & Security

Making homes efficient and electric contributes to the reliability and resilience of the energy system and markets. Better energy performance and improved demand management and response places less pressure on the energy system at times of high need, with more efficient options to deal with potential peaks. Co-ordinating consumer energy resources to optimise the

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[17] Doctors for the Environment Australia, 2023, Submission to the Inquiry on Home Electrification, Senate Economics Reference Committee, p.2
[18] Sustainability Victoria, 2022, The Victorian Healthy Homes Program: Research Findings
[19] Sweltering Cities and Renew, 2024, Future Climate Impacts on Home Energy Standards

balance of electricity demand and supply can help to maximise the efficiency of the energy system and minimise its costs to all households.

As highlighted in Climateworks report on Climate-ready homes,

> Upgraded homes that require less energy in turn reduce the amount of renewable energy generation, storage and network infrastructure that would otherwise be needed. While solar systems generate valuable energy, peak demands may not coincide with the times rooftop solar is available. Home and electric vehicle batteries can assist with managing peak demand and the current mismatch.[20]

Additionally, while Australia does not have a shortage of fossil gas at a national scale, the Australian Energy Market Operator (AEMO) has forecast that southern regions of Australia (including NSW, ACT, Victoria, Tasmania and South Australia) will face periods in the coming years where domestic demand for gas exceeds available supplies due to infrastructure constraints.[21] Reducing demand for fossil gas via efficient and electric homes is a cost-effective way to address this imbalance. Critically, it does this without the need for expensive new gas supply infrastructure which must be paid for by consumers and is likely to a shortened economic lifespan22 with high risk of stranding.

Current and future gas products, including 'renewable' gases like hydrogen and biogases, will have costs well above the historic cost of gas. Any potential gas source that could reasonably address future shortages will be prohibitively expensive. For example, Hydrogen requires extensive costly upgrades to gas appliances and networks and comes with safety and operational risks that remain unresolved. Removing demand for gas by making homes efficient and electric is the only guaranteed solution to domestic gas shortages as well as the most reasonable and efficient one.

5. Objectives, principles, and targets

This section of the Roadmap details the objective, principles and targets designed and adopted by the EEHC. They are intended to inform and guide the implementation of a transition to efficient and electric homes.

Decision-makers at all levels will need to adopt their own enabling governance to inform decisions, programs, and supports to implement efficient and electric homes. We recommend the objective, principles and

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[20] Climateworks, 2023, Climate-ready homes: Building the case for a renovation wave in Australia – summary report, p.10

[21] AEMO. 2024 Gas Statement of Opportunities.

[22] IEEFA. Reducing demand: A better way to bridge the gas supply gap and No shortage of solutions to gas supply gap.

targets developed by the EEHC be used as the template for how this should be undertaken.

5.1 Objectives

A robust objective ensures the suite of possible benefits from efficient and electric homes are realised to their maximum. The EEHC is driven by the following objective:

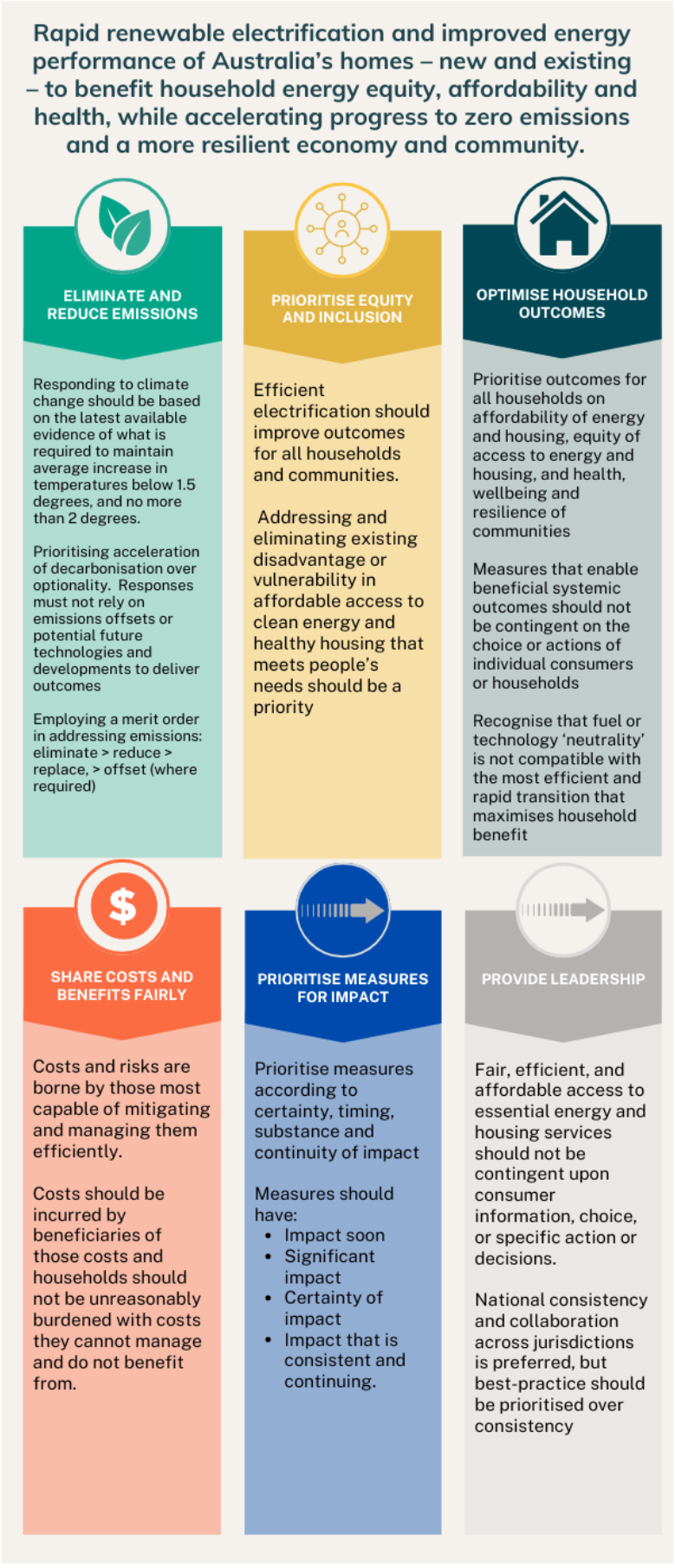
> Rapid renewable electrification and improved energy performance of Australia's homes – new and existing – to benefit household energy equity, affordability, and health, while accelerating progress to zero emissions and a more resilient economy and community.

5.2 Principles

For the Roadmap we have identified enduring principles to inform decisions on how best to achieve our objective (see figure 4).

All of the measures and actions identified in the Roadmap are shaped by these key principles and should enact them in order to promote achievement of the objective.

Figure 4. Principles to guide transformation to efficient and electric homes



5.3 Targets

Upgrading all Australian homes to be efficient and electric requires long-term certainty provided by concrete commitments and strong policy. These must be linked to targets and timeframes which are reportable and monitorable. Targets must be grounded in emissions reductions requirements and set both end-point objectives and interim points that can provide certainty and incentives for early action. This certainty is crucial for enabling:

- Australian households and businesses to start making informed investment and purchasing decisions as soon as possible and minimise the impact of poor decisions on households;
- State and Territory and local government alignment of policies, programs, and investments supporting these targets;
- Commencement of future planning for phasing-out residential gas networks to enable a managed, equitable and efficient transition for households; and
- Immediate emissions reductions benefit through electrification of fossil gas, reduced energy use and increased utilisation of DER.

Targets and commitments should be based on objective parameters, with the starting point being what is required to meet our global climate goals and commitments. This fosters consistent understanding, provides greater certainty and ensures that delivery of action is given the strongest chance of success. From this starting point practicalities including supply, workforce, budgets, can be considered transparently and priorities determined. What can practicably be delivered can then be monitored against what is required, which in turn will indicate to decision-makers where more ambition and resources is best directed.

Not all targets will necessarily be possible to meet in full, but they are nonetheless required to set a consistent, objective anchor to inform action. Accordingly, all targets should be expressed as universal with qualifications and refinements occurring as more detail is known, and progress occurs. Any qualifications must be identified and explained according to clear principles, with explanations of how they will be rectified to achieve the overall objective.

For example, it is likely there will be a percentage of complex, high-density residential buildings that will not be fully electrified efficiently by 2035. Work on a targeted, longer-term program to identify and respond to these buildings will need to be developed so they can electrify as soon as possible. This will also involve ensuring that all other interventions for these buildings, guided by the principles of this Roadmap, ensure residents of those buildings benefit from the most impactful interventions possible, and are not left behind in the interim.

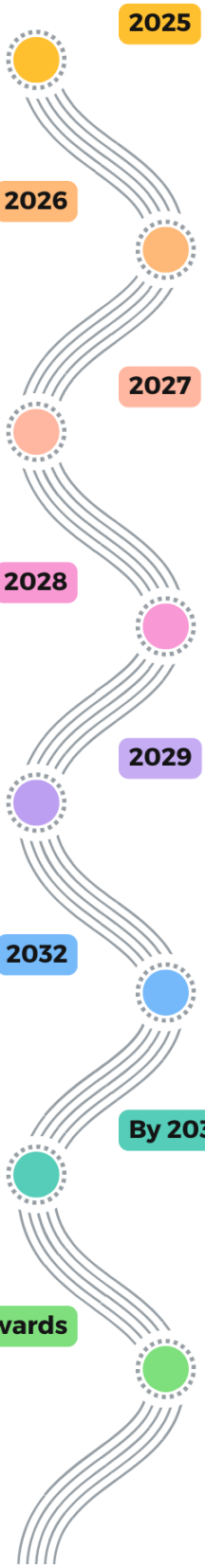
Sub targets should also be considered, including for low-income housing, apartments and rental properties to ensure adequate resources are allocated, and appropriate and tailored policies are developed.

Upgrading all Australian homes to be efficient and electric is a substantial nation-building task made significantly easier and less costly the sooner it is commenced. Any delay only increases the scale of the task and its associated cost.

On this basis we have developed the following timeline of starting point targets. They are necessarily extremely ambitious. They are intended as an example of evidence-based target setting, where targets are derived from objectively determined starting points (i.e. What is required to meet our emissions reductions requirements).

They are broadly achievable if meaningfully committed to and resourced by Government, industry, and private finance but will need to be refined as more detail of implementation is known.

Timeline



2025

- Commence a comprehensive suite of programs & supports to upgrade public, community, First Nations and low-income owner-occupier housing
- Roll-out tailored community information and engagement services
- Commission comprehensive national modelling to inform efficient and electric home upgrades

2026

- Mandatory home energy ratings disclosure in all jurisdictions
- Implement “key-features” minimum energy efficiency standards for rentals in all jurisdictions
- Reform of strata laws to support thermal upgrades and electrification

2027

- Finalise design of fair compliance and enforcement mechanism for performance-based minimum energy standards for rentals
- Complete a full review of national energy laws, standards and rules to ensure they are fit for purpose to facilitate the efficient, managed retreat of gas distribution networks.

2028

- Commence mandatory standards for new homes to be efficient, electric, zero-carbon ready homes with NCC 2028
- Commence modelled performance minimum energy standards for rentals

2029

- All jurisdictions have planned for the equitable phase-out of residential gas networks
- Commence strategic reviews to ensure 2035 target is on-track

2032

- Majority of public, community, First Nations and low-income owner-occupier housing has been upgraded to be efficient and electric

By 2035

- Majority of freestanding homes are efficient and electric

2035 onwards

- Majority of residential strata properties are efficient and electric
- Solutions found for the small percentage of homes that are hard to make efficient and electric

6. Pillars of efficient, electric and renewable homes

There are 3 key pillars of implementing efficient and electric homes – thermal efficiency, efficient electric appliances and consumer energy resources (CER). These complement the necessary work to phase out residential gas use and decommission the residential gas network, as discussed in section 7.3.

A recent report by Climateworks Centre[23] details the priority renovation pathways for each state & territory based on their averaged climate zones. Their report indicates there is no one-size fits all approach given the range of climates and the mix of fuels in transitioning the energy system. However, they consistently found that electrification needs to be coupled with thermal efficiency upgrades to achieve the biggest peak demand reductions (and hence impacts for households and the community).

At the outset it is critical to categorically state interventions cannot merely focus on consumer information and behaviour change. Such an approach makes success unacceptably contingent and guarantees failure. While support for the community to understand and contribute to improved energy performance is an important accompaniment, decision-makers must prioritise policies and programs that actively facilitate tangible physical improvements for Australian households.

Key determinants of the poor energy performance of Australian households and communities are physical, not behavioural. They are related to poor building standards, inefficient fuel sources and appliances, and business and service regulations unfit-for-purpose. Overcoming these structural and systemic flaws is not within the capacity of most households. These are issues where active change must be initiated, managed and supported by Governments through long term targets, the implementation of standards and regulations, and with supporting incentives and direct funding.

In reforming policies, market regulations and protections, decision makers must recognise the limits to how and which households can change their behaviour, and design interventions which are not reliant on household behaviour change and ongoing engagement with the energy system to achieve objectives.

[23] Climateworks Centre, 2023, *Climate-ready homes: Building the case for a renovation wave in Australia*

6.1 Thermal Efficiency

To fully achieve the social, economic and ecological benefits sought through upgrading Australian homes, electrification must be accompanied by thermal efficiency upgrades. As highlighted by the Energy Efficiency Council,

> … using and managing energy is just as critical to reducing bills and emissions as generating electricity… Energy efficiency improvements not only reduce overall energy demand, they can create downward pressure on energy prices and emissions, generating employment and lowering bills for consumers.[24]

Upgrading Australian homes must start with thermal efficiency. Homeowners, including rental providers, should be incentivised and supported to first upgrade the thermal shell of their house (insulation, draught proofing, window-glazing and shading).

Australia committed to the Global Renewables and Energy Efficiency Pledge[25] at COP28 which included:

- A commitment to work together in order to collectively double the global average annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.
- A commitment to put the principle of energy efficiency as the "first fuel" at the core of policymaking, planning, and major investment decisions.
- A commitment to take comprehensive domestic actions to contribute to the achievement of this pledge, including by adopting ambitious national policies on renewable energy and energy efficiency and reflecting this ambition in NDCs, working with cities and subnational governments, focusing on the key tools and enablers most relevant to national and local circumstances.

A greater focus on household efficiency will be crucial to achieve the targets outlined in the pledge.

Further information on energy efficiency

- Climate Council (2022) Tents to Castles: Building Energy Efficient, Cost-Saving Aussie Homes
- Climateworks Centre (2023) Climate-ready homes: Building the case for a renovation wave in Australia
- Energy Consumers Australia and Renew (2022) Energy Efficient Housing Research
- Energy Efficiency Council (2023) Clean Energy, Clean Demand

[24] Energy Efficiency Council, 2023, *Putting Energy Efficiency to Work: The Forgotten Fuel Series* p.1
[25] United Nations Climate Change, 2023, *COP28 Global Renewables and Energy Efficiency Pledge*

- Energy Efficiency Council (2023) Putting Energy Efficiency to Work: The Forgotten Fuel Series
- International Energy Agency (2023) 'Energy efficiency and behaviour' in Net Zero Roadmap: A Global Pathway to Keep 1.5 in Reach
- Race for 2030 (2021) Pathways to scale: Barriers to, opportunities from, and impacts of retrofitting one million+ homes

Efficient and electric appliances

Australian households need to be supported to replace existing inefficient and/or gas appliances for heating, hot-water and cooking with efficient and electric appliances. The current common practice of replacing 'like-for-like' is no longer fit-for-purpose and must end as soon as possible. These interventions are presented in order of priority.

Inefficient electric and/or gas hot water systems	➡	Efficient heat pump hot water systems
Inefficient electric and/or gas heating / cooling systems	➡	Thermal shell energy performance upgrades, fans and reverse-cycle air conditioners
Inefficient electric and/or gas cooking systems	➡	Efficient electric ovens and induction cooktops

Further information on efficient electric appliances

- Climate Council (2023) Smarter Energy Use: How to Cut Energy Bills & Climate Harm
- Energy Consumers Australia (2023) Stepping Up: A Smoother Pathway to Decarbonising Homes
- Energy Efficiency Council (2023) Clean Energy, Clean Demand
- Monash Climate Change Communication Research Hub (2023) Switching On: Benefits of Household Electrification in Australia
- Rewiring Australia (2021) Castles & Cars: Savings in the Suburbs through Electrifying Everything

6.2 Distributed & Consumer Energy Resources (CER)

CER enable households to generate, store and manage energy behind-the-meter through technologies including solar PV, batteries, electric vehicles and household energy management systems. While many Australian

households have already installed rooftop solar systems, access to solar and its benefits is unequal. Low-income households, renters and people living in strata properties are disadvantaged in accessing both CER and the benefits the enable.

Access to CER has benefits for individual households, the affordability of energy and the flexibility and resilience of electricity networks. Electrification of households allows large, flexible loads (like water heating, cooling and heating) to help improve electricity network utilisation, balance renewable energy in the system and ensure all households and the system (including those without solar assets) can benefit from excess solar energy at peak generation times. Electrified household load offers the opportunity for households who wish to, to sell their demand (and its flexibility) and benefit financially through demand response and demand management, ensuring the system is more efficient and lower cost for everyone.

Lower peak demand (through greater efficiency and greater demand flexibility) lowers network augmentation costs and lowers generation/wholesale energy costs for all households, energy users and the entire energy system. At the same time more flexible electrified load increases the utilisation of the electricity networks outside of peak times, lowering the unit cost of the network component of energy for all users.

Installation or access to CER (rooftop solar, batteries and household energy management systems) should be considered after energy performance upgrades have been made and there is a better understanding of their energy-use requirements in a more efficient home. This also ensures that households receive the most immediate health and energy affordability impacts first.
Crucially, it is not necessary or desirable for every home in Australia to install CER. Decision-makers need to design our future energy and housing systems to ensure that everyone benefits from the energy transition, regardless of their access to CER.

Tariff reform and energy market innovation will be required to ensure that households unable to install CER can still be given the opportunity to access the benefits of CER, with appropriate supports and protections. This includes things like better use of demand management and demand response, social and solar soaker tariffs, network batteries and more efficient public infrastructure.

Further information on CER

- Energy Efficiency Council (2023) Clean Energy, Clean Demand
- IEEFA (2024) Fast, efficient, flexible electrification can cut energy bills and support the shift to renewables

- IEEFA (2022) Cheaper, faster decarbonisation: What State governments can do to support distributed energy resources
- Renew (2020) Enabling Distributed Energy in Electricity Networks Final report (Phase 1)
- Renew (2019) Electric Vehicles, Electricity Bills & Energy Use

7. Implementing Efficient and Electric Homes

Upgrading all Australian homes to be efficient and electric within required timeframes, requires whole-of-government action across Commonwealth, state and territory, and local governments, alongside action from regulators[26], industry and social sectors.

This chapter of the Roadmap details these required actions. Context for key areas of reform is briefly described, followed by a series of key recommendations for decision-makers, and a list of external resources for further information on the topic is provided. These recommendations reflect the Roadmap approach and are intended to be iterative and are a mix of well-developed actions, and broad indicators of what form of action is required. In the case of the latter the intend is to signal where more work is needed to develop detailed actions.

The recommendations include which jurisdictions are responsible for implementing the recommendation, where C = Commonwealth Gov, S&T = State & Territory Govs, L=Local Govs, and ALL=all levels of government.

Building a political ecosystem for efficient and electric homes

Leadership, commitment and inclusive processes are needed by government, policymakers, regulators and industry to co-ordinate national and jurisdictional action on delivering efficient and electric homes. This involves providing certainty and robust policy signals by initiating:

- planning and regulatory reforms;
- collaboration across jurisdictions;
- national partnerships and multi-governance models;
- implementation of improved standards;
- signals and incentives for investment;
- implementation and co-ordination of supports and direct expenditure to target disadvantaged households; and
- development of a clear vision, public narrative and consistent information.

[26] Where actions for NEM bodies are identified, states and territories not covered by the NEM will need to implement comparable actions within their regulatory systems

Governance, planning and political leadership

Decision-makers must provide the political leadership necessary. This involves implementing strong governance and systems, long-term planning, prioritisation in budgets, ownership of the public narrative and leading by example.

Decision-makers need to engage with the public on why upgrading their homes to be efficient and electric is required, the benefits and how they are going to be supported on that journey.

Governance and systems should be guided by the objective, principles and timeline outlined earlier in this Roadmap.

Decision-makers can lead by example through adopting a whole-of-government and/or organisation approach to efficient electrification. Efficient electrification should be embedded into all departments, related agencies and assets.

While the vast majority of Australian homes can be made efficient and electric, there are a small number of dwellings that may be hard or impossible to efficiently electrify within the target timeframes. Governments, regulators and energy providers will have to consider how to approach these homes to determine and implement the most impactful interventions.

Hard to electrify dwellings may include some portion of:

- High-density buildings which have been constructed in a way (including using gas embedded networks) which makes efficient electrification of water heating and heating and cooling difficult or impossible without rebuilding or similarly unreasonably disruptive action.
- Residential buildings with electrical load and structural issues (for instance those buildings with heritage value which precludes substantial overhauls).

Targeted and flexible actions will be needed to consistently identify **genuinely** hard or 'impossible' to efficiently electrify properties and plan the most efficient response to their circumstances according to the principles guiding this Roadmap. In some cases, this may involve electrification with less efficient options, combined with arrangements to offset energy costs through thermal efficiency upgrades or access to cheap solar energy.

Governance, planning and political leadership recommendations

Jurisdiction		Priority Recommendations
All	**1.1**	Develop and implement **household (consumer) energy strategies** with objectives aligned with those of the roadmap. Strategies should:

		• Have a scope incorporating all aspects of policy and regulation which impacting the objectives (including product standards, regulatory reform, and direct grants and policy). • Involve review of associated legislation and regulation and agency policy impacting consumer outcomes in energy. • Prioritise equity of access to the beneficial impacts of consumer resources, services and interventions.
All	**1.2**	Evolve, co-ordinate and promote **cohesive and accessible public information** about the benefits and importance of household energy transition.
All	**1.3**	Design and implement **strong governance and systems** for the long-term project of efficient residential electrification promoting efficiency, collaboration and transparency. This should include identifying and adopting all relevant and appropriate product, service and trade standards (such as those detailed in the EEC insulation roadmap[27]).
All	**1.4**	**Develop and implement consistent overarching policy objective/s and principles** informing decisions, programs and supports designed and implemented in service of efficiency and electrification of Australian homes. These should be based off those detailed in this roadmap. The objective/s should include outcomes to achieve **improved energy performance**; reduce emissions in line with limiting global warming to **1.5 degrees C**; improve **energy security**; improve people's **health**, wellbeing, and **resilience to climate change** impacts; and **reduce poverty and inequality**.
All	**1.5**	Adopt **principles, timeline and target dates** for residential electrification and efficiency detailed in this Roadmap. Require the targets to be reviewed at least every five years and communicated in Australia's Nationally Determined Contributions and associated architecture at jurisdictional level.
All	**1.6**	**Government departments and agencies embed energy performance objectives**, goals/targets, and policies into

[27] Energy Efficiency Council, 2024, *Roadmap for Insulation Installation: Quality control and safety in the Australian market*

		their work. This should commence with an audit of every agency to assess relevant responsibilities, actions and work areas to influence.
All	**1.7**	Deliver governance reform to meet the '**energy efficiency first' principle**. Any regulatory mechanism introduced to manage an energy or electrification program should consider a "least cost" approach and prioritise energy efficiency as a first step in the electrification process
C	**1.8**	Through Energy Ministers and National co-ordination architecture for other relevant ministerial responsibilities, create a new national partnership with the objective of ensuring an orderly and equitable shift to efficient and electric homes. This multi-governance model for coordinating implementation is further detailed in the Many Hands Make Light Work report[28].
C	**1.9**	Ensure that the **sectoral plan for the built environment, energy and electricity and transport sector plans** and the **Net Zero 2050 Plan** are aligned with objectives, principles and timelines of the Roadmap and integrated to more effectively prioritise and unlock opportunities for emissions reductions through energy performance upgrades of existing homes.
C	**1.10**	Develop an economy wide electrification plan as part of the National Energy Transformation Partnership (NETP) or similar mechanism in consultation with sector peak bodies and stakeholders.
C	**1.11**	Require all new residential and commercial buildings to operate on high-quality electric appliances in **National Construction Code 2025**
L	**1.13**	Form **regional coalitions of councils** to drive sustainable outcomes at a local level and embed collaboration with Commonwealth and state and territory governments into these coalitions.
Jurisdiction		**Additional Recommendations**

[28] Cities Power Partnership, 2023, Many Hands Make Light Work: Connecting governments to accelerate climate action

All	**1.13**	Embed consumer (including low-income consumer) and energy performance stakeholders and expert engagement within governance structures for relevant programs and processes.
All	**1.14**	Commit to achieving zero-carbon ready new and existing government/organisation owned and leased buildings by 2030.
All	**1.15**	Commit to applying best-practice trusted, robust and credible building rating systems such as Green Star and **NABERS in all new government/organisation projects and existing assets and accommodation**.
All	**1.16**	Lead the development of **zero-carbon ready housing** through government-led projects as part of a policy to recognise whole-of-life running cost benefits of high energy performance on the cost of housing.
All	**1.17**	Create principles-based assessment systems and frameworks to identify dwellings that are genuinely difficult and/or functionally impossible to electrify efficiently within the timeframes, and develop a range of **electrification alternatives** according to their circumstances.
All	**1.18**	Create and implement a plan of alternative options and actions for buildings which meet set criteria of **difficult to efficiently electrify.** This plan should be derived from the same principles as this Roadmap and seek to align with objectives and timeframe targets, and must enable optimum benefit to impacted households.
All	**1.19**	Support the creation of **industry leadership groups in priority sectors** to champion best practice and collaboration.
C	**1.20**	Design, implement, review and update the **National Consumer Energy Resources Roadmap** to align with expanded scope (consumer energy roadmap) with structural links to jurisdictional strategies through the Energy and Climate Change Ministerial Council. Ensure expansion involves: • upgrade and alignment of standards and regulations,

		• regulations and policies promoting and ensuring equitable deployment of consumer energy resources, • reform measures supporting equitable benefit from deployment, support for equitable deployment (and benefit from) upgrades, with targeting to prioritise impact for those cohorts otherwise unable/unlikely to benefit
C	**1.21**	Progress on household electrification and efficiency upgrades be included in the Commonwealth Energy Minister's **annual climate change statement to Parliament**, and the advice provided by the Climate Change Authority to the Minister in advance of the statement (this should involve aligned reporting at jurisdictional level)
C	**1.22**	Establish a **national energy performance agency**. The agency would link policy areas responsible for energy, buildings, housing, industry, and transport; and ensure energy demand is as integral to energy system policy and market settings as energy supply.
C	**1.23**	**Resource consumer and community advocate capacity** and ensure structural opportunity to promote the interests of people and community in energy performance planning, governance, and delivery, to ensure outcomes are equitable and work for all people in the community.
C	**1.24**	Create a coordinated delivery architecture to streamline impact focused home thermal upgrades, energy efficiency and electrification. While details and prioritisation of refits must be based on climate zones, coordination and consistency of principles, participants, standards, information and supports should be implemented through a **National Retrofit Scheme (NRS)** to overcome the fragmented market of home energy services.
C	**1.25**	Establish a **National CER Technical Standards Body** in conjunction with jurisdictions and undertake reforms to ensure more robust and consistent application and enforcement of product, service and installation

		standards for consumer energy resources (including key energy performance interventions.[29]
S & T	**1.26**	Introduce consistent **Ecologically Sustainable Development Parameters for property developments** into State planning policy and regulatory frameworks.
S & T	**1.27**	**Resource the capacity consumer and community advocates** to advocate for the interests of the community and engage with processes developing and implementing policy in energy performance upgrades, planning, grant support, protections, regulations standards and information delivery, to ensure outcome and equity focus.
S & T	**1.28**	Require every planning scheme amendment and jurisdictional planning frameworks to include an assessment against relevant climate change mitigation and adaptation requirements and risk mitigation and management priorities.
S & T	**1.29**	Ensure adoption of science-based targets for high level planning, building, energy and regulatory policy (potentially through the recommendations and action of jurisdictional net-zero/emissions reduction Commissions and legislation. Ensure robust monitoring and update mechanisms.
L	**1.30**	Introduce consistent **Ecologically Sustainable Development Policies for developments** ensuring more resilient and liveable zero carbon buildings and precincts are promoted by local planning policies.

7.1.1 Data & information

Data on the age and energy performance of Australian homes, including public and community housing, is poor, incomplete and inconsistent. As a result, it is impossible to know the extent of improvements required, quantify and how to prioritise to achieve maximum impact against emissions and equity objectives. Paucity of data also undermines identification of opportunities, and accurate estimate of the cost and scale of upgrades needed. Without improved data and more information on Australia's housing

[29] Energy Efficiency Council, 2024, *Roadmap for Insulation Installation: Quality control and safety in the Australian market*

stock, appliance-use and CER, it is impossible for decision-makers plan and budget for upgrading Australian homes to be efficient and electric, and optimise benefits and efficiency. A similar lack of visibility over the number and types of gas appliances and different CER technologies used across Australian homes also impacts regulation, planning and government budgeting for home energy upgrades.

Data and information recommendations

Jurisdiction		Priority Recommendations
All	**2.1**	**Require gas distribution businesses to provide data** to all levels of government on number of residential gas connections in Australian households, by circumstances (e.g. single dwelling, multi-dwelling, shared hot water) and location. This audit should be used by all levels of government to plan the managed retreat of residential gas networks. Priority should be given to mapping the location and key characteristics of multi-unit connections and gas embedded networks.
C	**2.2**	Commission a **comprehensive baseline study of residential energy performance** (by building type, location and key characteristics) to build a critical mass of energy performance ratings and create a high-quality data set on residential energy performance. This should not delay ongoing work on implementation of electrification. This should be integrated with jurisdictional maps of gas connections and other key energy performance indicators and shared openly between jurisdictions.
C	**2.3**	Commission comprehensive modelling to measure the benefits of achieving zero energy carbon-ready existing homes and costs of delaying action. This should be regarded as a key foundation of public messaging and building support for the transition. Modelling should account for all material benefits of upgrading homes, including emission reduction, peak energy demand, health and resilience. This should not delay ongoing work on implementation of efficient electrification and should be drawn on in all reform processes (such as the update of the NCC) related electrification and household energy efficiency.
Jurisdiction		**Additional Recommendations**
All	**2.4**	**Require electricity DNSPs to provide data** to all levels of government on the electrification readiness of household electricity connections (where available) and work with gas DNSPs to provide relevant data on network assets around high-density/high impact gas connections (such as gas embedded networks).
C	**2.5**	Require **timely availability of aggregated real time data** from electricity distribution businesses to defined

		recipient entities (which may include policymakers, system planners, registered service providers such as those offering community battery and demand management and response services). This should include regulatory changes to ensure DNSPs have comprehensive network data access via metering framework, as an enabling measure.
C	**2.6**	Develop a nationally agreed set of **future climate scenario data**, including a schedule of updates and requirements of public availability.
S&T	**2.7**	**Audit domestic networks** in conjunction with network businesses to develop an accurate map of connections, usage, local area utilisation and associated industry requirements, as a basis for transition and retirement planning. Particular focus should be on multi-unit gas connections and gas 'embedded networks'.
S&T	**2.8**	Implement (or enable) a **monitoring architecture** for residential gas connections and key energy performance aspects including controllable hot-water, pool-pumps, EV charging.
L	**2.9**	Explore measures to **utilise and integrate planning and development control and approval powers** and mechanisms to contribute to monitoring of household connections and energy performance criteria and change.

7.1.2 Mandatory disclosure of home energy performance

Mandatory measurement and disclosure of home energy performance is a critical enabler of the upgrades required for efficient and electric homes. For this, a single, robust rating scheme consistently applied across the country is required. Home energy performance should be disclosed for all residential buildings when they are sold and leased. Both mandatory minimum rental energy efficiency standards and zero carbon ready building standards will be bolstered by mandatory disclosure of home energy performance. Mandatory disclosure will provide greater transparency over energy performance to people buying and leasing homes allowing for more informed decision-making by consumers and form the basis of critical consumer information consistency building trust and understanding of the process.

The Nationwide House Energy Rating Scheme (NatHERS) is a nationwide tool that currently provides energy ratings for new dwellings through building standards. Work is underway to develop NatHERS in-home rating scheme for existing homes and it is estimated the tool will be available in mid-2025 after trials throughout 2024.[30] NatHERs in-home should be the rating scheme used for mandatory disclosure and minimum energy performance rental standards.

Mandatory disclosure of home energy performance recommendations

Jurisdiction		Priority Recommendations
C	**3.1**	Provide a **national definition of a zero-carbon ready home** which is all-electric and low energy in line with NatHERs and an updated NCC. For example, the International Energy Agency defines zero-carbon-ready buildings as 'highly energy-efficient and resilient building that either use renewable energy directly or rely on a source of energy supply that can be fully decarbonised, such as electricity or district energy.[31]" This definition should form the basis of the standard adopted by the NCC and implemented by all jurisdictions as soon as possible.
C	**3.2**	Urgently finalise and implement a national residential building energy performance rating system for existing homes which is resourced to address key gaps in achieving zero carbon homes.
S&T	**3.3**	Commit to the implementation of **mandatory disclosure of energy performance** (by a nominated date) for all residences when they are sold and leased. Implementation commitments should commence disclosure at the earliest possible juncture, with transition measures where appropriate.

Further information on the political ecosystem for efficient and electric homes

- Australian Sustainable Built Environment Council (2022) Unlocking the pathway: Why electrification is the key to net zero buildings
- Climateworks Centre (2023) Climate-ready homes: Building the case for a renovation wave in Australia

[30] Department of Climate Change, Energy, the Environment and Water, 2022, Nationwide House Energy Rating Scheme
[31] International Energy Agency, 2023, Tracking Clean Energy Progress 2023: Buildings

- Council Alliance for Sustainable Built Environment et al. (2021) Climate change and planning in Victoria: Ensuring Victoria's planning system effectively tackles climate change
- Property Council of Australia and Green Building Council Australia (2023) Every Building Counts
- Sweltering Cities & Renew (2024) Future-proofing Australia's homes

7.2 Making standards, laws and regulations fit for purpose

Effective, well-designed standards, laws and regulation will support lowest-cost and high-quality efficient and electric upgrades for Australian homes and help ensure better outcomes are more equitably delivered for all households. Laws, rules and regulations of the energy market[32] require considerable reform to better support and facilitate efficient and electric homes. Standards for rental properties, new residential builds, upgraded existing homes and appliances will also need to be updated to make them fit-for-purpose. These standards will need to be supported by mandatory disclosure of home energy performance.

7.2.1 Energy markets, laws & regulations

Existing legislation, regulation and governance is predicated on supporting and expanding gas networks and increasing gas utilisation. Across most jurisdictions, regulations and policy impede improved standards of building and energy performance. Comprehensive, co-ordinated reform is urgently required to enable efficient and electric homes within the required timeframes.[33]

Priority areas of action must include:

- Reform of energy laws and rules to ensure they are fit for purpose to facilitate the efficient, managed retreat of gas networks. Laws and regulations should embed robust principles of beneficiary and causer pays, ensure fair sharing of cost and risk.
- Reform of state planning laws, energy safety and standards and other regulations to prioritise electrification and remove and reverse preferences for gas and support electrification.
- Reform of energy regulations and planning and safety regulations and policy to enable optimum implementation of efficient, flexible energy solutions including stand-alone power systems, micro-grids and demand response.

[32] Where actions for NEM bodies are identified, states and territories not covered by the NEM will need to implement comparable actions within their regulatory systems
[33] ACOSS, EEC, AiG & PCA, 2023, Enabling the energy performance revolution: energy governance and market reform

- Improve co-ordination between governments, regulators & businesses to align policy, planning and investment to enable the transformation of Australia's energy system.
- Ensure a unified whole-of-government responsibility to implement and oversee the progress and effectiveness of reforms.

Energy markets, laws and regulations recommendations

Jurisdiction		Priority Recommendations
All	**4.1**	Improve and implement **co-ordinated action between governments, regulators & businesses**. This should seek to align policy, planning and investments to enable the transformation of Australia's energy system away from reticulated gas. For example: • Ensuring co-ordinated policies and targets promoting electrification are supported by regulations which enable gas network retreat and efficient disconnection. • Collaboration between governments, electricity and gas networks to plan the orderly, efficient retreat of residential gas networks and efficient equitable electrification, particularly of multi-unit dwellings. • Identifying areas of high solar penetration and instituting co-ordinated plans to electrify large, flexible household loads as part of wider gas network retreat plans. • Aligning government rebate supports, tax incentives, white certificate schemes and with other government programs and policies to optimise impact for households and support equitable electrification.
All	**4.2**	Reform laws, policies and regulation to ensure electrification optimises local solar generation through improved opportunities for flexibility, solar-soaking and **demand response.** For households that cannot install solar, such as renters and those without the appropriate roof, the focus should be on equity enabling better outcomes which do not require consumer behaviour change.
C	**4.3**	Coordinate a **review of gas laws, regulations and policies**, and product and service standards and compliance through the National Energy Transformation Partnership. This review must be focussed on alignment of policies and regulations across jurisdictions with an objective of managing the retreat of residential gas networks, and promoting the rapid, efficient,

		electrification and upgrade of households within the target dates. Priority should be paid to: • reform of provisions on new connections, • providing scope to refuse service and implement network retirement, • permanent disconnections, • information provision, • how decisions on network augmentation and renewable products are made, • enabling electrification co-operation with electricity DNSP's, • reforming embedded network frameworks to enable unwinding, and • enabling electrification as a support for vulnerable consumers.
C	**4.4**	**Reform national energy laws** such as the National Energy Objectives and network Regulatory Investment Tests to promote, facilitate and value electrification, energy efficiency, demand management and social equity.
C	**4.5**	Reform the **Integrated System Plan** so that it becomes a genuine whole-of-system plan for the optimum transition of the energy system. Specifically ensure it better integrates measures to enable electrification, energy efficiency and demand management opportunities in future plans. This activity could be supported by resourcing the development of an annual Energy Performance Statement of Opportunities.
C	**4.6**	Move towards a single, **consumer-centred regulatory framework** for energy that efficiently and fairly allocates costs over time, with strong and enforceable consumer protections. This should be implemented through cooperation with jurisdictions to ensure jurisdictional schemes and policies incorporate consistent principles.
C	**4.7**	Develop and enforce **minimum technical standards** for consumer energy resources, their installation and operation. This should include robust standards requiring **interoperability** between devices.
Jurisdiction		**Additional Recommendations**
All	**4.8**	Assess and reform (or introduce) markets and programs (including through government funded programs and use of their own assets) to improve recognition (and utilisation) of value of **energy demand management** and

		other distributed energy resources. This can include action to reform white certificate schemes and linking with social and community housing upgrades.
All	**4.9**	Co-ordination and alignment of regulation, policies and processes which manage disproportionate risk (particularly to vulnerable households) and minimise the costs to consumers of transitioning away from gas. This includes, for example: • ensuring existing residential consumers do not bear risks or costs from the conversion of gas networks and the development of new potential 'renewable' gas opportunities; and • alignment of 'white certificate schemes' and reforms to target household electrification, particularly low-income households and other communities facing disadvantage.
C	**4.10**	Reform and expand the **Wholesale Demand Response Mechanism** to encourage more efficient commercial and industrial demand response and extend the mechanism households.
C	**4.11**	Reform the prevailing CER market arrangements to **enable CER aggregators and home energy management service (HEMS) providers to compete on an equal basis with retailers** in the provision of services to consumers, particularly demand response services. This should include ensuring protections frameworks are robust and extend to cover new services where required.
C	**4.12**	Ensure **sufficient funding to relevant regulators** for monitoring, compliance, and enforcement.
C	**4.13**	Progress **smart energy market reforms** to efficiently support the absorption of electrified gas loads with automation and flexibility. This should include as a minimum: • Network tariff reform • Mandatory static cost reflective network tariffs • Optional dynamic cost reflective network tariffs
C	**4.14**	Enable more efficient network utilisation and flexible demand management through robust **reforms to network pricing frameworks and practices** to encourage innovative network tariff designs which incentivise network utilisation outside of peak demand periods.

		Importantly, this should be regarded as completely separate from retail pricing and should not involve any requirement or expectation for action at the household level.
C	**4.15**	Improve network utilisation and make better use of CER assets through enabling **flexible export limits** (dynamic operating envelopes). This relies on the above reforms and providing Distribution Network Service Providers (DNSP) with visibility of the network through free and timely access to the full range of 'advanced power quality data'.[34]
C	**4.16**	Introduce common guidelines for existing retailer-led **peak demand reduction programs** to increase visibility and consumer protections.
S&T	**4.17**	**Expand and align 'white certificate' schemes** to incentivise uptake of efficient, flexible electrified household loads (including EV chargers), with measures to link efficiency schemes (such as the NSW ESS and PDRS) to an expanded wholesale demand response mechanism. Scheme expansion should include adoption **of equity principle**s to allow targeting of cohorts to support the objectives of the Roadmap and optimise alignment with other government and industry programs and policies (such as rebate schemes).
S&T	**4.18**	**Review energy laws and regulations** and identify and implement reform opportunities to encourage greater competition and efficient delivery of energy services – with priority to address delivery of demand response and stand-alone power systems.
S&T	**4.19**	Encourage retailers (and other aggregators and service providers) to offer more products, rebates, or incentives to households to encourage **demand response, battery discharge and load management** from those who wish to participate. This should include prioritising action to update protections and regulatory frameworks to ensure optimum consumer participation and benefit.
S&T	**4.20**	Strengthen **incentives for distribution networks** to increase uptake of the DMIS.

[34] PIAC, 2022, Submission to the AER's Review of the regulatory framework for flexible export limit implementation.

S&T	**4.21**	**Review and reform metering frameworks**, with priority to assess the capability of metering and the regulatory and industry framework governing metering and data management. This process should involve co-ordinated measures (including industry reform and government assistance) to support an accelerated, equitable, universal rollout of advanced metering by 2030, with a durable and efficient long-term metering and data framework that supports equitable consumer outcomes.

Building standards and policies

Building standards and policies are crucial tools to ensure new residential buildings are zero-carbon ready homes, and facilitate the upgrade of existing homes. Key policy development currently includes the National Code of Construction 2025 and 2028, the Trajectory for Low Energy Buildings, the Built Environment Sector Plan and the Electricity and Energy Sector Plan.

Strengthening building standards[35] and mandating efficient, all-electric, zero-carbon ready homes for new builds as soon as possible, will ensure all new homes built in Australia are efficient, electric and resilient homes. This will limit the number of dwellings requiring upgrades in the coming decades, saving money and emissions from day one.

Around 8 million dwellings were constructed prior to the introduction of any residential energy performance standards.[36] The average NatHERs rating of existing homes in Australia is 1.7 stars,[37] compared to new homes which should now be required to meet a rating of 7 stars. Delays in implementing the 7 star standard consistently across all jurisdictions must be addressed as an urgent priority.

Building standards recommendations

Jurisdiction		Priority Recommendations
C	**5.1**	**Set a date** and **create a long-term strategy to achieve zero carbon ready existing buildings** in line with Roadmap targets. This strategy should incorporate measures outlined in this Roadmap, and prioritise actions and set interim target dates according to Roadmap principles and targets.

[35] This should include proceeding to implement an 8-star standard as soon as possible.
[36] PowerHousing Australia, 2022, Australian affordable housing report.
[37] COAG Energy Council, 2019, Report for Achieving Low Energy Existing Homes

C	**5.2**	Implement voluntary standards to achieve zero carbon ready homes (best practice thermal efficiency, all-electric, powered by renewable), and **make them mandatory by 2028**. Voluntary standards now will provide strong signals to industry to be ready for the mandatory implementation in 2028.
C	**5.3**	Set out a **long-term strategy for climate resilient buildings** that can adapt to acute shocks and long-term stresses from climate change.
Jurisdiction		**Additional Recommendations**
All	**5.4**	Drive **harmonised compliance, monitoring and enforcement** of the National Construction Code. This could include increased compulsory testing e.g. of air-tightness and infrared imaging.
All	**5.5**	All new affordable social housing be built now at 7.5 plus star rating and renewable-powered.
S&T	**5.6**	Commence implementation of mandatory minimum energy performance standards (including and electrification) of existing rental properties. Implementation should be aligned with target timeframes and be staged to focus on the most significant, ongoing impact for the worst performing properties. Implementation should be informed by the Community Blueprint[38]. See Recommendation 13.1.
L	**5.7**	Assess opportunities to update local government legislation, planning instruments and approvals processes, to facilitate and enable the implementation of improved energy efficiency upgrades.

7.2.2 Appliance standards

Robust appliance standards ensure that Australian households can access quality, safe, efficient and affordable appliances which operate as intended and collectively support the outcomes expected. Crucially these standards ensure important appliances (such as inverters) operate as expected, at scale. This is vital to ensuring they consistently perform, and system planners

[38] Healthy Homes for Renters, 2022, *Community Sector Blueprint: a National Framework for Minimum Energy Efficiency Rental Requirements*

and operators can rely on them. Failure to deliver this means more expensive system investment than necessary, and early redundancy or obsolescence of appliances with unnecessary costs for all consumers.

To better enable efficient and electric homes, decision-makers need to raise appliance standards, improve the frameworks for updating and implementing them and ensure robust compliance, including ensuring open interoperability of device operation and management systems.

Australian households will need to start replacing existing gas appliances with more efficient and electric alternatives urgently and consistently at a huge scale. This will involve replacing appliances used for heating, hot water and cooking. Households and tradespeople need clear signals, including timelines, mandates and training, to understand, inform and facilitate this replacement process.

Appliance standards recommendations

Jurisdiction		Recommendations
All	**6.1**	Require **best practice standards compliance** procurement and provision through Commonwealth and jurisdictional programs and budgets (such as NSW's ESS, PDRS and white certificate, appliance replacement and other rebate programs)
C	**6.2**	**Review upgrade energy performance standards for household** appliances (including water heaters and air-conditioners). Appliances which do not meet robust minimum standards should be removed from the market. • Modernise the existing standards approach under the GEMS act to allow it to value the significant cost and emissions savings from upgrading from gas to efficient electric appliances. • Harmonise and update regulatory standards for appliances including GEMS Act, and Australian Standards technical standards to encourage electrification, DER integration and demand flexibility trading readiness. • Implement co-ordinated measures to remove non-compliant appliances from the market.
C	**6.3**	Initiate **a co-ordinated plan to identify and address standards failures** in key consumer resource assets (such

		as inverters, PV, batteries, and chargers).[39] This should include updated and enforceable mandatory codes and standards for the products, the installation and the services they support.
C	**6.4**	Investigate and implement enforceable measures to **ensure open interoperability of device operation and management systems** and pursue reforms to protect against proprietary contracting and 'lock-ins'.[40]
C	**6.5**	Ensure that gas appliances and their emissions are considered in the development of national indoor air quality standards, which should be prioritised in the next National Clean Air Agreement work plan
C	**6.6**	**Set an end date for the sale of gas appliances**, particularly water heaters and heaters, in advance of decommissioning the residential gas network.
C	**6.7**	**From 2025, Require residential gas appliances to be replaced with efficient electric alternatives** once they reach their end-of-life. An exceptions criteria should be developed to ensure any exceptions are minimised and confined only to circumstances where efficient electric options are impossible in the short term.
S&T	**6.8**	Implement programs to **facilitate and subsidise 'trade-in' and replacement of household appliances**, prioritising by impact (those with high-energy or emissions intensity, which are more flexible and likely to deliver immediate ongoing to the household). This must include water heaters, heating and cooling systems and fridges as a minimum, and prioritise support for electrification.
L	**6.9**	Consider opportunities to support co-ordinated information provision through planning and development approvals process, and support for local trades and services education.

Further information on the making standards, laws and regulations fit for purpose

[39] PIAC, 2023, Submission to the AEMC Review into Consumer Energy Resources Technical Standards Draft Report

[40] PIAC 2023 Submission to the AER review of the regulatory framework for flexible export limit implementation, p. 7

- ACOSS, EEC, AiG & PCA (2023) Enabling the energy performance revolution: energy governance and market reform
- Australian Sustainable Built Environment Council (2022) Unlocking the pathway: Why electrification is the key to net zero buildings
- Climateworks Centre (2018) Decarbonisation Futures: buildings
- Institute for Energy Economics and Financial Analysis (2024) Appliance standards are key to driving the transition to efficient electric homes
- PIAC (2023) Submission to the AEMC Review into Consumer Energy Resources Technical Standards Draft Report
- PIAC (2023) Submission to the AER review of the regulatory framework for flexible export limit implementation
- Property Council of Australia and Green Building Council Australia (2023) Every Building Counts
- Renew (2021) Households Better Off: Lowering energy bills with the 2022 National Construction Code
- Sweltering Cities & Renew (2024) Future-proofing Australia's homes

7.3 Enabling fair and efficient gas retirement

To achieve the emissions reduction, energy affordability, health and resilience benefits, residential gas use must be rapidly phased out.

Upgrading Australian homes to be efficient and electric will contribute towards this phase-out and the eventual decommissioning of residential gas networks. This section outlines what is required for the efficient retirement of residential gas networks, including action on planning, regulation, appliance, consumer information and cost and risk sharing.

Decommissioning residential gas networks requires leadership, coordination and strong, consistent policy signals from decision-makers. The necessary rapid phase-out of domestic demand for gas should be driven by a facilitated, orderly change process. Leaving this transition to be driven by consumer choice alone will lead to more inequitable outcomes and invite greater cost and confusion for consumers. Large numbers of consumers (such as renters) are unable to choose to replace their household appliances, and consumers who do have the ability to choose are often not empowered with the right information to make an informed choice between gas and electricity.

7.3.1 Gas regulation & policy

Existing regulations of gas businesses, particularly gas network businesses, are not consistent with climate change policies and a contemporary understanding of what will be required to efficiently transition and decarbonise the energy and housing sectors. Put simply, regulations are no

longer fit-for-purpose to deliver efficient investment and use of energy that is in the long-term interests of consumers.

Existing legislation, regulation and governance is predicated on supporting fundamentally inefficient investment in expanding gas networks and increasing gas use. This includes legislative and policy frameworks for the National Gas Law, the National Gas Rules, and State and Territory legislation governing the use and operation of gas infrastructure in each jurisdiction.

Gas regulation recommendations

Jurisdiction		Priority Recommendations
All	**7.1**	Co-ordinated action from State, Territory and Commonwealth Governments for **comprehensive reform of energy laws, standards and rules** to ensure they are fit for purpose to facilitate the efficient, managed retreat of gas distribution networks. This includes: • Ensuring the NEL/NEO refer to energy consumers rather than gas or electricity consumers • Ensuring the full life-cycle cost of any new (non-residential) gas network connections is recovered from the connecting entity. • Implementing guidelines for assessing residential network areas for decommissioning. • Implementing guidelines for identifying areas for ongoing gas network need (i.e. Areas with ongoing industrial need) and a framework for transitioning these areas to more renewable fuels. • Initiating process to consider the fair share of costs for decommissioned networks, according to the principles of the Roadmap. This must include requiring asset write-downs.
All	**7.2**	Implement policy and regulatory reform to **allow (and require) gas network businesses** to assess their networks and progressively **plan for and implement staged efficient network retreat.** These plans should be developed in co-operation with State governments, involve equity considerations, and seek to prioritise areas (and consumers) with most scope for impact.
All	**7.3**	Implement specific regulatory reform to enable gas network businesses to **refuse new connection requests**
C	**7.4**	**Comprehensive reform of national energy laws, standards and rules** to ensure they are fit for purpose to

		facilitate the efficient, managed retreat of gas distribution networks.
Jurisdiction		**Additional Recommendations**
All	**7.5**	**Improve co-ordination between governments, regulators & businesses**. This should seek to align policy, planning and investments to enable the transformation of Australia's energy system away from reticulated gas.
L	**7.6**	Introduce local planning restrictions that prohibit new residential buildings from connecting to the gas network due to local air quality concerns.
L	**7.7**	Provide energy efficiency and electrification information to residents seeking planning permission.
L	**7.8**	Seek to incentivise household electrification through rates and other mechanisms.
All	**7.9**	State and Commonwealth Governments initiate a process to **consider the fair share of the unrecoverable costs of decommissioned residential gas networks**, according to the principles of the Roadmap. This process should inform policy and planning at all levels.

7.3.2 Residential gas network retirement plan

A comprehensive plan for the phase out and decommissioning of residential gas networks will provide certainty and signals for decision-makers, households, gas businesses and regulators. The current lack of planning is resulting in business-as-usual for gas businesses and expensive and ad-hoc self-removal from networks by early adopting households. This is not a feasible long-term solution.

Residential gas network retirement plan recommendations

Jurisdiction		Priority Recommendations
All	**8.1**	Commonwealth, State & Territory governments and regulators design and implement gas network retirement roadmaps. This should include: • state-specific dates for elimination of emissions from residential use of gas. • Detailed, principles-based policy roadmaps for reaching these goals. • Alignment with other commonwealth and state programs (such as rebates and social supports) • Co-ordination with electricity networks.

		• Plans to address hard to efficiently electrify residential buildings (such as some apartments). • Arrangements for cost sharing. • Require gas businesses **to identify areas requiring gas infrastructure replacement, of declining demand or low network utilisation** as a basis for managed network retreat with sufficient signals to consumers and governments. • Decisions on who should pay and when.
All	**8.2**	Develop co-ordinated measures for gas networks to work with Governments to **assist vulnerable households by supporting targeted electrification**. This should include: • Combining government rebate support, white certificates and gas network 'vulnerability' programs, to electrify households experiencing vulnerability. • Ceasing business supported rebates for gas appliance installation and replacing them with appliance replacement programs swapping inefficient gas appliances, for efficient electric ones. • Directing innovation allowances and budgets towards measures to enable electrification of vulnerable households in 'difficult to electrify' circumstances.
All	**8.3**	Implement policy and regulatory changes to **Remove high costs and disincentives** to disconnect from gas networks and ensure any new connections to gas networks involve full life-cycle costs being recovered from the connecting entity.
C	**8.4**	Require gas network businesses to include **plans for the efficient and safe decommissioning of the networks** in the five-year reviews with the Australian Energy Regulator.
S&T	**8.5**	Implement **immediate moratoriums and bans on new gas connections** to residential and small-business developments, starting with multi-unit developments.

7.3.3 Cost and risk sharing

Gas is increasingly expensive for Australian households. As more people electrify their homes, those left on residential gas networks could face higher network charges as the pool of people from which these charges are paid shrinks. Without regulatory reform and co-ordinated government planning and supports it is very likely that low-income and rental households who are least able to make decisions or bear these costs will be the households left on the networks, exacerbating their disadvantage in not being able to make their homes efficient and electric.

Managed reduction in domestic gas demand involves risks which must be managed and mitigated to ensure Australian households are not unreasonably impacted. Decision-makers need to consider the appropriate sharing of costs and risks of potential unrecovered gas network asset costs between consumers, governments and gas network businesses. This may require changes to National Gas Law, regulation and policy, considered holistically in conjunction with retail pricing and practices. In any case, it will involve conscious action to ensure consumers, particularly more vulnerable consumers, are not unreasonably burdened with risks and costs they cannot manage.

Gas businesses have known about the risks of climate change and the role of methane for many years and prudent risk management should have involved planning for network retreat and declines in demand without unreasonable impacts on consumers. Gas networks' current form of regulation exposes them to demand risks, and most fully regulated gas networks have experienced returns on equity that are much higher than the risk-free rate of return. These factors should be key considerations in developing any measures to deal with the ongoing risks and costs related to managed network retreat and rapid household electrification.

Gas network decommissioning fair cost and risk sharing recommendations

Timeframe		Priority Recommendations
All	**9.1**	Provide targeted assistance to consumers (especially those experiencing vulnerability). This should include at a minimum: • Combining government rebate support, white certificates and gas network 'vulnerability' programs, to electrify households experiencing vulnerability. • Ceasing business supported rebates for gas appliance installation and replacing them with appliance replacement programs swapping inefficient gas appliances, for efficient electric ones. • Directing gas business innovation allowances and budgets towards measures to enable electrification

		of vulnerable households in 'difficult to electrify' circumstances. • Working with gas network businesses to develop and implement efficient retreat plans which prioritise social housing, regional communities and areas of low-income or low-efficiency housing. • Implementing programs and policies to directly support permanent disconnection, with priority for key cohorts experiencing disadvantage. This may include direct subsidies for permanent disconnection addressing the cost differential between 'temporary disconnection' and permanent disconnection, and the potential safety issues this causes.
C	**9.2**	Ensure that **future new gas network investments** (such as network conversions and augmentations to accommodate distributed hydrogen to households) are **solely the risk (and cost) responsibility of gas network businesses** and any new connecting entities, and cannot be recovered from existing household and small business consumers.
C and S&T	**9.3**	Provide clear guidance on the **appropriate sharing of costs and risks of potential unrecovered gas network assets** between consumers, governments and gas network businesses. This should inform future regulatory decisions, and must include **guidelines requiring the write-down of network assets** and may also include consideration of subsidies for the cost of decommissioning residential gas connections.

Further information on enabling fair and efficient gas retirement

- Climate Council (2022) Switch and Save: How Gas is Costing Households
- Climate Council (2021) Kicking the Gas Habit: How Gas is Harming our Health
- Friends of the Earth Melbourne (2022) Community Gas Retirement Roadmap
- Grattan Institute (2023) Getting off gas: why, how, and who should pay?
- Energy Consumers Australia (2023) Risks to gas consumers of declining demand
- Renew (2022) Limiting energy bills by getting off gas
- Institute for Energy Economics and Financial Analysis (2023) Managing the transition to all-electric homes
- Institute for Energy Economics and Financial Analysis (2024) Gas networks are making persistent and significant supernormal profits

7.4 Implementing efficient and electric homes for all Australians

While early-adopting households are upgrading their homes to be efficient and electric largely off their own volition, the majority of Australian households will need to be incentivised and supported to upgrade, prioritising people and communities experiencing disadvantage. Various funding and financing arrangements will be required alongside supports targeted at specific, disadvantaged cohorts. This section of the Roadmap outlines these broad financing arrangements and identifies actions required to support low-income homeowners, social and private renters, multicultural communities, First Nations communities and households, and apartment-dwellers.

7.4.1 Financing efficient and electric homes

Efficient and electric home upgrades can come with significant upfront costs for some households, presenting a barrier for many, particularly those with lower incomes. The long-term savings enabled by efficient and electric housing make it an undeniable benefit over time. However, many households are not able to access the $5K-$40K[41] that is sometimes required to undertake all upgrades to a zero-carbon ready home. Even for those households who may be capable, cost of living pressures often mean that home energy upgrades can't be made a priority within the required timeframes.

Upfront costs of efficient and electric home upgrades include:

- Thermal shell upgrades including insulation, draught proofing, window-glazing and shading.
- Appliance replacement for heating, hot-water and cooking.
- Gas network disconnection fees.
- Any wiring and other associated upgrades sometimes required to enable electrification.
- Consumer Energy Resources (CER) including rooftop solar, batteries and household energy management systems.

The Household Energy Upgrades Fund announced at the 2023 federal budget represents an important first step in starting to provide supports for households to make their homes efficient and electric. However, much more work is required to address the range of financial barriers faced by households, including for those without any capacity to service loans. Governments should examine opportunities to co-ordinate industry, government finance, efficiency schemes and other finance and support options to more comprehensively address the financing and funding barriers many households face to making their homes efficient and electric.

[41] Climateworks, 2023 *Climate-ready homes: Building the case for a renovation wave in Australia* p.35

Funding and financing recommendations

Jurisdiction		Priority Recommendations
C	**10.11**	Deploy some HEUF loans via pilots of innovative funding models including on-bill financing and income contingent loans and use this to **design options for a large-scale finance package** to significantly accelerate electrification over 10 years, particularly among low- and medium-income households.
C	**10.2**	**Establish a Special Purpose Funding Vehicle,** the Australian Efficiency and Resilience Retrofit Fund (AERRF), to provide rolling funds to invest in energy performance and climate-resilience upgrade programs across all low-income housing tenure types (public housing, community housing, low-income homeowners and private rental). This could later be expanded to support other housing. Separate special purpose finance vehicles could be set up if necessary to implement each program
Jurisdiction		**Additional Recommendations**
All	**10.3**	Work with financial institutions to **normalise green financial products**. Specifically, pursue long-term green, social or other bonds, to provide **low-cost, long-term sources of debt capital** that can directly finance and refinance (public and private sector) investments to support energy performance and climate-resilience upgrades.
All	**10.4**	Support Australians to electrify and upgrade the energy efficiency of their homes with **a mix of low-interest and targeted zero-interest loans.**
C	**10.5**	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.
C	**10.6**	Issue a new Clean Energy Finance Corporation Investment Mandate Direction to **enable the HEUF to reach lower income households**
C	**10.7**	Leverage ARENA and the CEFC to encourage innovation through **funding for R&D, pilots and commercialisation**.

ALL	**10.8**	Establishing Environmental Upgrade Finance program across local councils to provide low-cost, long-term on property finance and additional targeted subsidies.
C	**10.9**	Investigate **establishing an Electrify Everything Loan Scheme**[42] that provides financing at purchase for efficient electrification upgrades. The loan would be secured on property title and repaid at the sale of the property.
S&T	**10.10**	Amplify, boost, support, coordinate and broaden **state-based rebates, incentives,** and **Energy Efficiency Obligation schemes,** ensuring they incorporate targeting for equity. Schemes, rebates and incentives should be broadened beyond solar PV and heat pumps to electrification equipment such as battery storage, induction cooking appliances that replace gas cooking, demand flexibility enabled space heating that replaces gas heating and smart EV charging equipment. Consideration should be given to also including energy efficiency building upgrade measures for homes below a certain standard (such as 2 or 3 stars), where the benefits of upgrades and both substantial and predictable.
	10.11	Amend tax law so that capital works deductions for new or replacement appliances for rental properties are only available for accredited energy efficient and electric appliances

7.4.2 Enabling mechanisms

In addition to funding and financing mechanisms, there are enabling measures required to support uptake of efficient and electric homes.

Jurisdiction		Priority Recommendations
ALL -	**11.1**	Provide targeted communications and 'all-in-one' concierge services, to assist residents in accessing federal and state financial incentives and subsidies, information and audits, and access qualified and certified trades, for energy upgrades with. The service could be delivered via one or a coordinated/aligned mix of third parties such as local councils, private

[42] Rewiring Australia, 2024, *2024-2025 Pre-Budget Submission to the Australian Government*, pp.8-14

		certified providers, community organisations, and state agencies.
S&T	**11.2**	Implement mandatory disclosure of energy performance on properties for sale or lease.
C(S+T)	**11.3**	The Federal Government directly invest (and enable aligned State investment) in accelerated deep upgrades for low-income housing and utilise this investment to: • Support **new business development** and local manufacturing. • Support **training and job creation** in local communities. • Support **training and upskilling for First Nations people, marginalised groups, women and the long-term unemployed**. • Promote meaningful employment for people experiencing **long-term unemployment**, **First Nations people, people with disability, and others marginalised in the labour market**, including through social procurement guidelines and employment and training programs targeting those groups,
ALL	**11.4**	**Establish a transparent verification and certification process** enabling data collection, ensure compliance, and provide confidence to homeowners, landlords, lenders and insurers to support implementation and financing of upgrades. This should include an audit and advice function to provide consistent information.

7.4.3 Low-income homeowners

While low-income homeowners may own a property, their low/fixed incomes (such as those on pensions) make it challenging to afford the upfront costs of home energy upgrades. Many also face other costs of living pressures including increased energy prices, food, medicines, and insurance. Homeowners with a mortgage will face additional barriers to financing and repaying required investments for home energy upgrades. Decision-makers should include provision of a range of supports to low-income homeowners to ensure the household energy transition can leave them better off.

Recommendations for supporting low-income homeowners

Jurisdiction		Priority Recommendations
	12.1	Utilising funding mechanisms outlined above, to provide targeted support to help low-income homeowners access home energy upgrades. Support could include subsidies, access to no-interest loans and tailored and culturally appropriate services (see recommendation 11.1 for further information on services).

7.4.4 Social and private renters

More than 30% of Australians live in rental properties and many will rent for their entire lives. Existing tenancy laws provide no scope for renters to electrify or improve the energy performance of their home. Without any requirement to do so, landlords rarely upgrade the housing they provide to be healthy, efficient and affordable[43].

Mandatory minimum energy efficiency standards for rental properties are essential and overdue. Not only will these standards help to facilitate efficient and electric Australian homes, but they will also help to provide basic protections and living standards for Australians who rent. This includes families with children and older people. People on low incomes and first nations people are more likely to rent their home. Well performing, healthy homes should be available for these people.

Decision-makers should familiarise themselves with the Community Sector Blueprint: a National Framework for Minimum Energy Efficiency Rental Requirements. The recommendations in this section of the Roadmap are aligned with the Blueprint and we recommend that decision-makers adopt the objectives, principles and outcomes contained in the Blueprint as part of a range of measures to improve energy performance in rental homes.

Landlords are paid to provide housing, an essential service. Like any other essential service provider, they have a responsibility to ensure it meets an acceptable standard of safety; and does not endanger the health of people paying for that service. This is a basic community expectation and polling regularly indicates 70% of Australians support the introduction of minimum energy efficiency rental standards[44]. Decision-makers should implement minimum standards that are proactively enforced to ensure compliance and that the intended benefits to health, climate, cost of living and the economy are delivered to households and communities.

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[43] Lang et al. 2022, "Energy efficiency in the private rental sector in Victoria, Australia: when and why do small-scale private landlords retrofit?" in *Energy Research and Social Science*, vol.88

[44] Healthy Homes for Renters, 2021, *Essential poll shows widespread support for minimum standards for renters*

Where landlord supports are deemed necessary to accelerate implementation, these should be developed in line with recent advice to Governments.[45]

There are approximately 437,700 social housing properties in Australia (public housing, community housing, and First Nations Community-controlled housing), home to people on low-incomes. Many of these properties have poor energy efficiency and no renewable technology access. Like people in private rentals, people in social housing have no agency to improve the energy performance of their property.

Prioritising social housing energy upgrade programs provide considerable opportunities to encourage markets, supply chains and workforces while prioritising households most in need of support in their journey to living in an efficient and electric home. Improving the energy performance of social housing stock:

- efficiently targets low-income households, First Nations households, renters, and some of the worse performing (and most emissions intensive) housing stock;
- can be delivered efficiently and at scale through large, professional property managers;
- has significant benefits in addressing retail energy debt accumulation, reducing ongoing health issues and costs for households more likely to be experiencing disadvantage;
- creates market signals and builds the capacity of supply chains and the workforce; and
- is labour intensive and creates local jobs throughout all regions.

Recommendations for supporting private and social renters

Jurisdiction		Priority Recommendations
All	**13.1**	**Implement mandatory energy performance rental standards** in line with the **Community Sector Blueprint**: a National Framework for Minimum Energy Efficiency Rental Requirements. Staged implementation should commence at this point, with timeframes for full implementation in-line with efficient and electric homes objectives, signalled from the outset. • Commence implementation of mandatory disclosure of energy efficiency standards no later than 2026

[45] Healthy Homes for Renters, 2025, *Advocates and Industry unite to urge Federal Government to support renters and landlords with energy upgrades*

		• Commence in 2025 with key features including priority fixed appliances, insulation and draught proofing
		• Establish systems for performance standards in rental properties, including fair & enforceable compliance mechanisms by 2028.
		• Commence performance standards in rental from 2028 which ensure at least
		  ○ Minimum 3 stars for multi-unit dwellings
		  ○ Minimum 4 stars for detached dwellings
		• Progressively ratchet up performance standards towards end targets from 2030 onwards
		• Ensure any landlord incentives are in line with recommendations developed through the Healthy Homes for Renters collaboration and provided to Governments.[46]
		• Include establishment of independent monitoring and enforcement mechanisms for mandatory minimum standards that ensure non-compliant landlords face meaningful likelihood of being discovered and penalised. Compliance mechanisms must not rely on individual renters raising and pursuing complaints to avoid placing the onus of enforcing compliance on them, and to ensure that renters are not put in the position to have to choose between raising a compliance issue or potentially threatening the security of their accommodation. This may involve adopting multiple monitoring and enforcement frameworks and utilising complementary tools, such as local government rating and development approval processes, and broader safety audit processes (such as those for smoke detectors).

	13.2	The Federal Government, in partnership with state and territory governments, **build on existing social housing upgrade funding to fully fund energy performance** (energy efficient, all electric, with rooftop solar benefit access) and where needed climate-resilient upgrades, for all **public housing and regional and remote Aboriginal community-controlled housing. This should prioritise Aboriginal and Torres Strait Islander**

[46] Healthy Homes for Renters, 2025, *Advocates and Industry unite to urge Federal Government to support renters and landlords with energy upgrades*

		housing. Ideally this should be completed by 2030. Governments should provide additional funding for replacement of stock (where it is not cost effective to upgrade), to ensure there is no net reduction in present or future stock.
	13.3	The Federal Government, in partnership with state and territory governments, **build on existing social housing upgrade funding to establish a non-competitive continuous grants and finance mechanism administered through Housing Australia, to support energy performance** (energy efficient, all electric, with rooftop solar) and, where needed, climate-resilience upgrades for **community housing that is owned and managed by the Community Housing provider**. • Access to non-competitive continuous grants to pay up to 90% (or 00% depending on size of the community housing provider) to implement the upgrades, including project assessment and project management. • Supplement the grants with low-cost finance • Provide additional funding for replacement of stock (where it's not cost effective to upgrade), to ensure there is no net reduction in present or future stock
All	**13.4**	**Adopt objectives to guide action on energy performance of private and social rentals**: minimum energy efficiency standards for rentals should improve the thermal comfort and minimise the energy consumption of rental homes to reduce energy bills and support the health and wellbeing of people who rent, as well as contribute to a zero-emissions energy sector in line with limiting warming to 1.5°C.
All	**13.5**	**Build the foundation for national rental home upgrades**. While minimum mandatory rental standards are likely to be the most effective policy intervention to improve the energy performance of rental homes, the following items under this measure would build knowledge and evidence to assist implementation of such standards and include: • A national baseline study of the energy performance of rental homes. • Pilot methods to build engagement with landlords and agents.

		• Run a trial and evaluation of different technical interventions to improve energy performance in a range of rental properties across the country. • With states and territories, provide funding for co-development of feature-based minimum rental standards, with a long-term goal of implementing performance- based rental standards. • Provide seed funding for the Clean Energy Finance Corporation (CEFC) to develop a finance program to support landlords to implement upgrades to comply with minimum rental standards.
C	**13.6**	Direct Housing Australia to prohibit investing in housing that uses gas.
Jurisdiction		**Additional Recommendations**
All	**13.7**	To support implementation of mandatory energy efficiency performance standards (including electrification) in rental properties, **consider the use of incentives for landlords, ensuring that any incentives are targeted and equitable** and used to encourage compliance and greater ambition[47]. Where incentives are used, they should • Be conditional on limiting rent increases. • Support community housing providers to meet standards • Be used in advance of mandatory standards to encourage early movement • Be means tested and not available to owners of multiple properties
C	**13.8**	**Potentially expand HEUF** to include community/social housing providers.
L	**13.9**	Provide information and resources to help renters implement low-cost solutions to improve the energy performance of their homes.
L	**13.10**	Assist renters and landlords in accessing federal and state financial incentives and subsidies for energy upgrades with targeted communications and 'all-in-one' concierge services and vetted providers (see recommendation 11.1 above).

[47] Ibid.

7.4.5 First Nations communities and households

Many First Nations communities are among the most disadvantaged, exacerbated by the poor energy performance of their housing and the impact this has upon their health, and economic wellbeing. Remote Indigenous communities are often at the end of network lines, resulting in poor levels of reliability. They are more likely to experience significantly higher costs because of poor housing stock and appliances, and a lack of effective retail competition. Many of these communities rely on prepaid metering cards to access electricity and can go for days or weeks without electricity because they cannot afford a new metering card. This makes people more reliant on housing thermal efficiency to stay cool. The health, affordability and sustainability gains achievable through efficient and electric housing upgrades for these communities are significant, with enormous potential for ongoing impact.

First Nations housing faces similar and additional barriers to that experienced by broader regional and remote communities but can benefit the most from electrification and improved energy performance.

The Commonwealth Government recently released the First Nations Clean Energy Strategy which they co-designed alongside First Nations communities and stakeholders.[48] First Nations participants in the strategy consultation identified that housing and energy are fundamentally entwined, and that the Strategy needs to incorporate the two.

Participants provided feedback that poor energy performance is an impediment to reducing energy costs for First Nations households and communities which demonstrates the necessity for government action to prioritise efficient and electric First Nations housing. The recommendations included in this section come from the First Nations Clean Energy Network.[49]

Recommendations for supporting First Nations communities and households

Jurisdiction		Priority Recommendations
All	**14.1**	**Phase out gas** in First Nations community / social housing by 2030.
All	**14.2**	Leverage partnerships to **conduct comprehensive housing assessments** of existing stock to identify deficiencies, prioritise upgrades and address energy inefficiencies in First Nations housing stock.

[48] Commonwealth DCCEEW, 2024, First Nations Clean Energy Strategy
[49] First Nations Clean Energy Network, 2024 *Submission to the First Nations Clean Energy Strategy* pp.11-12

All	**14.3**	Directly invest in energy audits and deep and accelerated upgrades for First Nations housing and utilise this investment to (i) support new First Nations business development and local manufacturing; and (ii) support training and job creation with First Nations people and in First Nations communities.
All	**14.4**	**Develop a "First Nations Electrification Program**" (which should also include financial incentives and affordable financing, including grants) which would be designed to support fuel shifting to electric appliances (e.g. replace existing inefficient heating and cooling systems with efficient reverse cycle air conditions; replace inefficient hot water systems with heat pump hot water systems; replace gas cooking systems with efficient induction electrical systems; plan for electrification of transport systems including electric vehicles, etc.)
C	**14.5**	**Establish a funding pool to be called "Renewable Energy Funding for First Nations Housing**" the purpose of which is to install renewable energy technologies (like solar and battery storage) on First Nations housing - noting the positive impact of rooftop solar on reducing electricity costs and improving energy security for First Nations households.
C	**14.6**	Mandatory energy performance reporting and disclosure requirements for any Australian Government funding directed towards First nations housing - requirement to (a) report on energy performance of portfolios and (b) measure and address financed emissions in First Nations housing portfolios.
Jurisdiction		**Additional Recommendations**
All	**14.7**	**Strengthen and enforce energy efficiency regulations and standards** for residential buildings, incorporating First Nations perspectives and cultural considerations.
All	**14.8**	**Implement reforms to metering and payment regulations and** protections to ensure more robust payment assistance protections and support. Reforms should respond to community needs and involve community developed models.
C	**14.9**	The Federal Government, in partnership with state and territory governments, build on existing social housing

		upgrade funding to **establish a multi-year program to fully fund energy performance and climate-resilience upgrades for all First Nations housing** before 2030.
S&T	**14.10**	**Mandate minimum standards for appliances** being sold in remote communities, and regional towns and centres (Greenhouse and Energy Minimum Standards)
L	**14.11**	Assist First Nations residents in accessing federal and state financial incentives and subsidies for energy upgrades with targeted communications and 'all-in-one' concierge services and vetted providers.

7.4.6 Apartments

Upgrading apartments, multi-dwelling buildings and strata properties to be efficient and electric presents notable social, legal and technical challenges. These housing arrangements will broadly have distinct hurdles due to multiple ownerships, a blend of owner-occupiers and renters, private and shared energy infrastructure, limits to CER installation and the presence of embedded energy networks. Strong government policy signals and legislation, clear timeframes and accessible consumer information will be needed to help address strata issues. Decision-makers will need to collaborate across jurisdictions, with industry and with organisations such as strata peak body groups to fully identify and address the added social, legal and technical challenges of making apartments efficient and electric.

Recommendations for efficiently electrifying apartments

Jurisdiction		Recommendations
All	**15.1**	**Develop and resource specific interventions for apartments** that build on the knowledge and experiences of strata peak bodies, sustainability strata organisations and local councils.
All	**15.2**	Implement support mechanisms identified in the Unlocking Sustainable Strata Report including: • Repository of strata specific information • Document and publish case studies • Produce guides and proformas • Electrification and upgrading research • Community engagement • Strata sustainability fund • Educating strata and sustainability sectors

All	**15.3**	**Provide targeted grants and tailored finance products** to support the electrification of apartment buildings.
C	**15.4**	Co-fund targeted programs for energy upgrades of strata apartments as per above recommendation 14.3
C	**15.5**	Where the dwelling is a sole occupancy unit in an apartment building, ratings (e.g., NatHERS) should **complement the NABERS base building rating** (where applicable).
C	**15.6**	Update the National Construction Code to ban gas connections to new apartment developments.
S&T	**15.7**	**Reform relevant strata laws and/or implement new governance options** to improve energy efficiency and performance in existing apartments. This may include, for example, limiting or prohibiting the ability of strata schemes to prevent or restrict upgrades or upgrades in individual strata lots that may be required to meet new mandated energy efficiency standards.
S&T	**15.8**	Roll-out targeted funding and programs for the energy upgrades of strata apartments such as the successful Victorian Government Solar for Apartments program.
L	**15.9**	Provide information and resources to help apartment owners and owners corporations improve the energy performance of their homes.

Further information on implementing efficient electrification for specific cohorts

- ACT Council of Social Service (2023) Supporting a fair, fair and inclusive energy transition in the ACT
- Australian Council of Social Service (2024) Funding and Financing Energy Performance and Climate-Resilient Retrofits for Low-income Housing
- Australian Council of Social Service (2024) The benefits of home energy upgrades
- Australian Sustainable Finance Institute (2023) Industry Workshop: Finance for Home Retrofits Report
- Brotherhood of St Lawrence (2023) Enabling electrification: Addressing the barriers to moving off gas faced by lower-income households
- First Nations Clean Energy Network (2024) FNCEN Submission in response to the First Nations Clean Energy Strategy Consultation Paper

- Healthy Homes for Renters (2022) Community Sector Blueprint: a National Framework for Minimum Energy Efficiency Rental Requirements
- Merri-bek Council (2023) Merri-bek Council National Energy Performance Strategy Consultation Submission
- Yarra City Council and Merri-bek Council (2023) Unlocking Sustainable Strata

Community Engagement & Communications

7.4.7 Community engagement and communications

A lack of accurate, unbiased, accessible consumer information and assistance is currently a barrier to making Australian homes efficient and electric, particularly for many multicultural communities. It is difficult for consumers to be certain that improved energy performance and electrification is in their interests and know where to start on their electrification journey, which vendors to trust and where to find support. This is often exacerbated by misinformation from entities who have a vested interest in slowing the pace of residential electrification.

Australians require accurate, trustworthy and accessible information on why and how to upgrade their home to be efficient and electric. This information must be supported by broader enabling policies, funding and supports. Community engagement and consumer education alone will not be sufficient to facilitate efficient and electric homes within the necessary timeframes.

Consumers would benefit from the creation of information and engagement services that provide:

- Independent, updated information,
- assistance regarding electrification, improved energy performance, consumer resource deployment, and beneficial operation of resources,
- demonstration of benefits for various upgrades,
- accessing home energy assessments,
- assistance in identifying support,
- assistance in planning upgrades,
- assistance in accessing reliable service-providers, and
- assistance in accessing government and industry assistance schemes.

These types of services can be built into the central delivery mechanisms for upgrades and be linked to the number of innovative finance schemes which are currently being proposed. Information and engagement services can also be leveraged as an efficient means of building trust and community connection, serving as a central point for outreach and building social licence.

Recommendations for community engagement and communications

Jurisdiction		Recommendations
All	**16.1**	**Integrate energy literacy programs with other assistance measures**, such as the one stop advisory service, rebates, finance and upgrade and auditing programs, and ensure energy advice and support programs are maintained at the decadal scale.
All	**16.2**	**Provide accessible information on products and services** which support efficient household electrification consistently and independently, supporting all consumers to make informed decisions for their homes.
C	**16.3**	**Develop and fund a national a public communications campaign** to promote energy efficient, all-electric homes as safe, healthy, and part of a clean energy future.
C	**16.4**	**Fund place-based community engagement and education programs.** Programs to support households (with access to culturally and linguistically diverse information and services) to find out information on the benefits of upgrades, what upgrades are needed, organise suitable trades and installation, available incentives, how to demonstrate compliance, and other relevant information.
S&T	**16.5**	With funding from the Commonwealth, implement a range of advisory services, including drop-in centres, mobile hubs and online platforms.
S&T	**16.6**	Support local governments' communications and programs for efficient and electric homes.
L	**16.7**	In partnership with federal and state governments implement local communications campaigns for efficient and electric homes. Integrate information with local government approvals and development processes.

7.4.8 Resourcing multicultural community engagement

Different communities have varying energy experiences and needs and will require different strategies to ensure efficient electrification can meet those needs. Targeted funding should be made available to multicultural

organisations to run deep engagement and support programs which can help shape the implementation of efficient electrification policies.

These recommendations have been written in collaboration with a range of organisations that work in and with different multicultural communities across Australia on energy and climate action. These include Sydney Community Forum, the Sydney Alliance, Democracy in Colour, Asian Australians for Climate Action, Environment Victoria and Queensland Community Alliance.

Recommendations for resourcing multicultural community engagement

Jurisdiction		Priority Recommendations
All	**17.1**	**Fund enduring programs** with long-term timeframes, rather than 12–36-month limitations, to provide scope to undertake the deep community listening and connection building work required.
All	**17.2**	**Build relationships with a range of existing community leaders** (formal and informal) as they are trusted and connected.
All	**17.3**	**Engage with communities with the time and intention to listen and seek insights**. Different communities will have their own structures and requirements, and often have their own solutions to unique issues they are experiencing, including how to improve awareness of and access to efficient electrification in a way that best suits their community.
Jurisdiction		Additional recommendations
All	**17.4**	**Work with pre-existing organisations, cultural groups and other communications networks** e.g. the Arab Council, Pasifika church groups and informal advice networks.
All	**17.5**	Develop and provide information that is: • **easily accessible in multiple formats**, including through direct dissemination by existing community leaders, • **in different languages**, • **culturally appropriate**. E.g. images used in visual materials (also noting that images and infographics can be as or more effective than translations), and • in **simple, understandable language not jargon**.

All	**17.6**	Have people with English as a second language review flyers, websites and other communication materials for **plain language and cultural appropriateness**.
All	**17.7**	**Use cultural events** relevant to local migrant communities **as promotion opportunities.**
C	**17.8**	Fund the employment of local energy advisers from diverse cultural backgrounds to deliver energy services and information.
C	**17.9**	Australian Energy Council and the Australian Energy Regulator partner with culturally and linguistically diverse (CALD) community groups to improve the quality of information and assistance for CALD consumers.[50]
C & NSW	**17.10**	Fund a pilot **mobile Community Energy Hub** in Western Sydney with Sydney Community Forum. If successful, roll out in other regions and States & Territories.[51]
S&T	**17.11**	Develop information resources and fund education programs that include trusted communicators and local-specific information in everyday language to reach diverse communities.
L	**17.12**	In partnership with federal and state governments implement targeted community engagement programs for efficient and electric homes.

7.4.9 Greenwashing

The ACCC has identified concerning examples of greenwashing in the energy sector as part of their ongoing compliance and enforcement priority 'Consumer, product safety, fair trading and competition concerns in relation to environmental claims and sustainability.[52] The first step in overcoming this barrier must be to address inaccurate or misleading information through robust responses to greenwashing, including regulation of green claims and strong enforcement action.

[50] For e.g. see AER and Sydney Community Forum, 2024, *Consultation summary: Voices for Power listening session*

[51] Energy Consumers' Australia and Sydney Community Forum, 2024, *Insights Report: Understanding the diversity of consumers and their experiences of the energy system*

[52] Australian Competition and Consumer Commission, 2024, *Compliance and enforcement priorities*

Overcoming greenwashing in the gas industry requires reform of regulations to reduce the perverse incentives they currently provide to gas businesses. It also requires Government action to give direction to gas businesses in relation to their responsibilities to consumers and ensure the provision of accurate and timely information and advice.

Gas network businesses have continued to incentivise new connections and increased household gas demand. This has included continuing to offer incentives for households to switch to gas appliances without providing accurate information regarding the impacts and costs of those appliances and the risk that households will be left with stranded investments.

Avoiding greenwashing recommendations

Jurisdiction		Recommendations
All	**18.1**	**Reform laws and regulations to address overstated, inaccurate and misleading climate-related claims** of gas companies. Climate related claims of energy businesses should be evidence-based, consistently communicated, and independently verified.
All	**18.2**	Ensure information platforms utilise **consistent terminology and robust, evidence-based assessments** of sustainability and emissions.
C and S&T	**18.3**	**Ban gas businesses from offering cash or other incentives** for new gas appliances

Further information on community engagement and communication

- Australia Institute (2023) Community attitudes to home and car electrification
- Energy Consumers Australia and Sydney Community Forum (2024) Insights Report: Understanding the diversity of consumers and their experiences of the energy system
- First Nations Clean Energy Network (2024) FNCEN Submission in response to the First Nations Clean Energy Strategy Consultation Paper
- Sydney Community Forum 2023 Submission to Residential Electrification Senate Inquiry
- Voices for Power 2023 Our roadmap to clean and affordable energy

7.5 Building a supply chain and workforce ecosystem

Upgrading Australia's housing stock to be efficient and electric represents an ongoing economic opportunity to build domestic capacity, resilience, prosperity and employment. Planning, targets and collaboration across governments, industry, unions and education providers will be crucial to

achieving the necessary supply chain and workforce requirements to ensure Australian homes are efficient and electric within the recommended timeframe.

Robust, long-term employment and supply chain targets provide industry with the certainty required to scale up and develop the capacity required to meet the needs of the community. Long-term targets will underpin ongoing processes to upgrade technical training, education and professional capacity through universities, vocational training institutions, commencing with the upskilling of existing workers and trainers.

Supply chain and workforce recommendations

Jurisdiction		Priority Recommendations
All	**19.1**	Develop robust supply chains to support: • Capacity, competency and knowledge of appliance installers, • Local jobs, good jobs, First Nations jobs, and • Manufacture of electric appliances, prioritising local content.
All	**19.2**	Partner with building industry peak bodies, unions and trades associations to **educate retailers, tradespeople and installers** about superior all-electric alternatives to gas appliances.
Jurisdiction		**Additional Recommendations**
All	**19.3**	Require government-funded projects and companies who receive government funding to **deliver on training mandates**.
All	**19.4**	**Improve the attraction and retention of apprentices and trainees**; including those not traditionally represented in the industry (women, First Nations and CALD workers).
C	**19.5**	**Develop a targeted workplace and skills strategy**, including national and regional skills assessment, subsidies for retraining at university and certificate level courses, to ensure there is a sufficient pipeline of local and international workers and students trained and ensure there is the workforce in place to meet the increased demand.
C	**19.6**	Lead harmonisation efforts around training and standards between jurisdictions.

C	**19.7**	**Establish a nation-wide professional development campaign** to support electricians and plumbers to upgrade their skills and understanding of opportunities to provide accurate information and continue supporting households as trusted advisers.
C	**19.8**	Implement a **robust accreditation framework** for businesses and workers delivering residential electrification upgrades, including requirements for: • Compliance with strict safety standards, • All workers to have completed minimum task familiarisation and relevant upskilling training, o Including building designers and other ancillary trades/roles that will be part of the broad ecosystem of home energy upgrades, • Minimum apprenticeship and training ratios, and • Minimum labour standards.
C	**19.9**	Develop and apply a **comprehensive, industry led monitoring, compliance, and enforcement framework** to regulate the implementation of an accreditation scheme for the safe and efficient delivery of residential electrification upgrades.
C	**19.10**	**Build the manufacturing base for energy efficiency and electrification** equipment and appliances, such as monitoring equipment and technology, insulation, windows, shading and industrial equipment, including heat pumps, as well as advanced manufacturing including solar and wind componentry, electrolysers, batteries, and grid control technology, as part of Australia's response to the US Inflation Reduction Act.
C	**19.11**	**Amend the curriculum for plumbing and gas-fitting qualifications** to include a restricted electrical licence to enable more rapid disconnection activity and installation of heat-pump hot water replacements.
C	**19.12**	Create loans to reskill mature-age plumbers and gas-fitters.
C	**19.13**	Provide direct funding for energy transition Registered Training Organisations.
C	**19.14**	Fund mentoring and support for apprentices to improve completion rates.

Further information on supply chains and workforce

- Electrical Trades Union et al. (2022) Tomorrow's Trades to Power Australia's Future
- Jobs and Skills Australia (2023) The Clean Energy Generation

8. Further Resources

General

Australian Council of Social Service (2024) Funding and Financing Energy Performance and Climate-Resilient Retrofits for Low-income Housing

Australian Sustainable Built Environment Council (2022) Unlocking the pathway: Why electrification is the key to net zero buildings

Climate Council (2023) Smarter Energy Use: How to Cut Energy Bills & Climate Harm

Climate Council (2022) Switch and Save: How Gas is Costing Households

Climateworks Centre (2023) Climate-ready homes: Building the case for a renovation wave in Australia

Energy Consumers Australia (2023) Stepping Up: A Smoother Pathway to Decarbonising Homes

First Nations Clean Energy Network (2024) FNCEN Submission in response to the First Nations Clean Energy Strategy Consultation Paper

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

IEEFA (2024) Fast, efficient, flexible electrification can cut energy bills and support the shift to renewables

IEEFA (2022) Cheaper, faster decarbonisation: What State governments can do to support distributed energy resources

Monash Climate Change Communication Research Hub (2023) Switching On: Benefits of Household Electrification in Australia

Renew (2021) Households Better Off: Lowering energy bills with the 2022 National Construction Code

Renew (2022) Limiting energy bills by getting off gas

Rewiring Australia (2021) Castles & Cars: Savings in the Suburbs through Electrifying Everything

Sweltering Cities & Renew (2024) Future-proofing Australia's homes

Electrification and health

Australian Council of Social Service (2024) ACOSS Summer Heat Survey 2024

Asthma Australia (2022) Homes, Health and Asthma in Australia

Climate Council (2021) Kicking the Gas Habit: How Gas is Harming our Health

Doctors for the Environment (2020) Home Gas Appliances and Your Health: Fact Sheet

Victoria

Environment Victoria (2023) Gas sector emissions and Victoria's new 2035 climate targets

Environment Victoria (2023) It's a Gas: How ditching gas this winter can cut heating bills by 75%

Environment Victoria & Renew (2021) Creating Victoria's first gas-free suburbs

First Nations Clean Energy Network (2023) Victoria Policy Overview: First Peoples and Clean Energy

Friends of the Earth Melbourne (2022) Community Gas Retirement Roadmap

IEEFA (2024) Why Victoria's ban on networks offering gas appliance rebates is a win for energy consumers

IEEFA (2023) 'Renewable gas' campaigns leave Victorian gas distribution networks and consumers at risk

IEEFA (2023) Ending the sale of gas appliances would address Victoria's fossil gas dilemma and unlock savings for consumers

IEEFA (2023) Managing the transition to all-electric homes: An economical solution to Victoria's fossil gas dilemma.

New South Wales

Climate Council (2021) Path to Net Zero: How NSW can Kick the Gas Habit

First Nations Clean Energy Network (2023) New South Wales Policy Overview: First Peoples and Clean Energy

IEEFA (2024) Eight ways NSW could cut energy bills during the cost-of-living crisis, and beyond.

Queensland

First Nations Clean Energy Network (2023) Queensland Policy Overview: First nations and Clean Energy

Solar Citizens (2022) How Solar is Driving Electricity Price Reductions in QLD

South Australia

First Nations Clean Energy Network (2023) South Australia Policy Overview: First Nations and Clean Energy

IEEFA (2024) Fact sheet: As gas bills rise in South Australia, all-electric homes are the most cost-effective solution

SACOSS (2023) Efficient heating and cooling in Adelaide homes

Tasmania

First Nations Clean Energy Network (2024) Tasmania Policy Overview: First Nations and Clean Energy

IEEFA (2024) Tasmania could cut its energy bills by prioritising household efficiency and exports to the mainland

Western Australia

First Nations Clean Energy Network (2024) Western Australia Policy Overview: First Nations and Clean Energy

Renew (2021) Affordable energy choices for WA households

Australian Capital Territory

ACT Council of Social Service (2023) Supporting a fair, fast and inclusive energy transition in the ACT – ACT small energy consumers' understanding, planning and support needs

Northern Territory

First Nations Clean Energy Network (2023) Northern Territory Policy Overview: First Nations and Clean Energy

9. Appendix 1

350.org

ACT Council of Social Service

ANU Battery Storage and Grid Integration Program

Asian Australians for Climate Solutions

Australia Institute

Australian Council of Social Service

Australian Manufacturing Workers Union

Australian Sustainable Built Environment Council

Australian Sustainable Finance institute

Boundless Earth

Brotherhood of St Lawrence

Buildings Alive

Changing Weather

Coalition for Community Energy

Community Housing Industry Association Victoria

Clean Energy Council

Climate Media Centre

Climateworks Centre

Consumer Action Law Centre

Consumer Policy Research Centre

Cooksafe Coalition, Australia

Doctors for the Environment, Australia

Environmental Leadership Australia

Energetic Communities

Energy Consumers Australia

Energy Efficiency Council

Environment Victoria

First Nations Clean Energy Network

Friends of the Earth, Melbourne

Getup

Grattan Institute

Green Building Council Australia

Healthy Futures

Institute for Energy Economics and Financial Analysis

Labor Environment Action Network

Multicultural Australia

Merri-bek City Council

The New Joneses

Newtown Climate

NSW Council of Social Service

NSW Decarbonisation Innovation Hub

NSW Nature Conservation Council

Tenants' Union of NSW

Property Council of Australia

Queensland Council of Social Service

Race for 2030

Renew

Rewiring Australia

Shelter NSW

Solar Citizens

South Australia Council of Social Service

Sunrise project

Sweltering Cities

Sydney Alliance

Sydney Community Forum

Tasmania Council of Social Service

The Justice and Equity Centre

Trumpet PR

UTS Institute for Sustainable Futures

Victoria Council of Social Service

Victorian Trades Hall Council

Western Australia Council of Social Service