Climateworks CENTRE

Level 27, 35 Collins St,
Melbourne VIC 3000

P: +61 3 9902 0741

info@climateworkscentre.org

climateworkscentre.org

28 September 2023

Economics References Committee
Senate Standing Committees on Economics

Lodged electronically

To whom it may concern,

Climateworks Centre submission on Residential Electrification

Climateworks Centre welcomes the opportunity to respond to the Senate Economics References Committee on Residential Electrification. Climateworks Centre bridges the gap between research and climate action, operating as an independent not-for-profit within Monash University. Climateworks develops specialist knowledge to accelerate emissions reduction, in line with the global 1.5°C temperature goal, across Australia, Southeast Asia and the Pacific.

Context

Buildings contribute around a fifth of Australia's greenhouse gas emissions and 55 per cent of Australia's total electricity consumption (ClimateWorks Australia 2020; Harrington & Toller 2017). The buildings sector can play a significant role in reducing energy demand and resultant emissions across the economy, helping Australia to decarbonise in line with the Paris Agreement and meet its nationally determined contribution. Climateworks modelling indicates the building sector would reduce emissions by 73 per cent below 2020 levels by 2030, and reach net zero emissions by 2050 on a least-cost pathway aligned with a 1.5°C limit (ClimateWorks Australia 2020). Alignment with a 1.5°C scenario would also require a 49 per cent decrease in residential building energy intensity – which can be achieved through energy efficiency and electrification. The key challenge for the sector is to minimise peak energy demand, which can be accomplished through widespread deployment of readily available relevant solutions, discussed in more detail below. The cheapest time to electrify homes and improve their energy performance is during construction, which can be achieved through regulatory change such as in the National Construction Code. For existing buildings, relevant solutions include upgrading external walls, ground floor and roof through measures including improved insulation, sealing draughts and upgrading window systems, and improving fixed appliances for space heating and cooling and hot water (ClimateWorks Australia 2020).

Summary

Upgrading residential buildings will help Australia develop a clean energy grid and ultimately achieve net zero emissions. It is encouraging that residential electrification is becoming a national priority as a part of efforts to decarbonise the building sector. Efficient electrification also brings with it numerous co-benefits. For households, electrification will help to alleviate energy poverty, protect households from energy price spikes, and improve household comfort and occupant health. Benefits also extend to the societal level, including decreased health system costs through improved occupant health associated with less gas use in the home.

For electrification to be cost-effective and maximise the benefits to households, it should be undertaken in parallel with improvements to home energy performance. Most of Australia's existing homes require significant upgrades to their thermal shell to reduce energy use, emissions, and meet a standard for zero carbon. Homes with better energy performance can also be flexible about when energy is used, reducing peak energy use. Thermal shell upgrades bring the additional benefit of minimising the increase in energy demand otherwise expected from electrification, thereby reducing the need for additional grid infrastructure and the associated costs.

Response to Terms of Reference

This submission responds to four Terms of Reference for the Senate Inquiry into Residential Electrification. These responses are supported by evidence and modelling from our upcoming *Renovation Pathways* report, to be released in late 2023.

Climateworks provides the following responses to the Inquiry's Terms of Reference:

(e) the optimal timeline for household electrification accounting for the likely timing of decarbonising electricity

Our research recommends taking a 'fabric-first' approach for existing homes.[1] The order of these upgrades – fabric-first and electrification – is important for the worst-performing homes (which are leaky and uninsulated) so that consumers' experiences of energy-efficient appliances are optimal, and the homes can adopt the most efficient appliance technologies. The fabric-first approach is also cost-effective for society as a whole: it will reduce overall energy use and therefore emissions, helping to avoid additional network costs and externalities from the social costs of carbon, and unlock the co-benefits of healthier, more resilient, climate-ready homes (Climateworks Centre 2023 [Forthcoming]). For this reason, we recommend implementing a national home energy upgrade program to focus on improving the thermal performance of homes, supported by programs for electrifying fixed appliances and installing rooftop solar.

Upgrades to a building's thermal shell to improve home energy performance before conducting household electrification at scale will reduce the potential impacts on the grid of increasing energy demand due to electrification. It will also improve financial and wellbeing benefits to households. Potential upgrades to the weak areas of a home's thermal shell include:

- Improving insulation of the external walls, ground floor, and ceilings or roof space
- Reducing draughts and uncontrolled air flow
- Adding full-length insulating curtains or blinds
- Improving window frames and glazing
- Adding external shades to windows
- Installing a heat recovery system.

Completing these fabric upgrades before household electrification also means that smaller heating and cooling appliances can then be installed in homes, and they will need to be used less often, reducing the upfront and energy use costs and directly benefiting households' wallets. The cumulative impact of these upgrades also reduces additional energy demand on the grid due to mass electrification, which will reduce infrastructure costs at a societal level and likely have knock-on benefits for household budgets (Climateworks Centre 2023 [Forthcoming]).

(f) the impacts and opportunities of household electrification for domestic energy security, household energy independence and for balance of international trade

To maximise the opportunity to improve domestic energy security, household electrification must be coupled with a program to upgrade the thermal performance of homes. Thermal efficiency reduces household energy consumption and peak energy demand on the grid, increasing domestic energy security (Climateworks Centre 2023). This is particularly important in the context of a changing climate: thermally upgraded houses will perform better in heat extremes and have lower energy

[1] A fabric-first approach prioritises the need to reduce the amount of energy needed to heat, cool and operate the building by improving the performance of the thermal shell.

consumption, and therefore will be more resilient to the ongoing and increasing challenges of climate change. These upgrades increase thermal security at a household level and energy security at a grid level.

(h) solutions to the economic barriers to electrification for low-income households

While regulatory change through updates to the National Construction Code should be aimed at all homes, to achieve optimal climate and social outcomes, government spending on electrification and thermal upgrade policy initiatives should prioritise vulnerable households, including those who are low-income, medically vulnerable, renters, and First Nations households. These vulnerable groups occupy the worst-performing homes, have the least agency to act, and have the highest incidence of energy poverty, so they have the most to benefit from energy performance upgrades and electrification (Climateworks Centre 2023). In addition, prioritising vulnerable households can stimulate the supply chains, skills and materials needed to decarbonise Australia's building stock at scale without initially creating excessive demand.

Direct financial support through government subsidies can be provided to low-income households who cannot access low-interest loans. Direct investment in government-owned social housing is a powerful way for the government to lead by example and upgrade these buildings to a high-performing standard.

For all households, a key economic barrier to electrification is the cost of upgrading the home's connection to the grid if this is required to allow for the inevitable increase in electricity demand from electrification. This challenge can be overcome by upgrading the home's thermal performance first, to reduce the energy required for heating and cooling, which is the largest portion of a household's electricity demand.

(k) any other matters

Electrification alone is not sufficient to decarbonise Australia's residential building stock. Climateworks modelling indicates that, for Australia to achieve the required scale of carbon emission reductions on a least-cost pathway to legislated targets, climate-safe thermal upgrades must be conducted at scale, alongside electrification with energy-efficient appliances, and installation of solar panels on homes that are suitable for rooftop solar systems (Climateworks Centre 2023).

The wallets of both owner-occupier and renter households will directly benefit from the electrification of fixed appliances done in conjunction with thermal upgrades and, to a lesser degree, installation of rooftop solar. Climateworks modelling shows that the combination of thermal upgrades and electrification is cost-effective on average, resulting in energy bill savings that offset the cost of financing the upgrades, even for households that would finance the upgrades through their mortgage up to our modelled 'modest' level of thermal upgrade (Climateworks Centre 2023).

Energy efficiency upgrades and electrification of homes will improve the health of occupants. Removing gas appliances through electrification could improve respiratory health by reducing the asthma burden in children (Knibbs et al. 2018). Other health outcomes are more effectively achieved by upgrading homes' thermal performance: decreasing cold exposure within the indoor environment, eliminating mould growth, and reducing energy poverty through lower energy bills (Sustainability Victoria 2022; Howden-Chapman et al. 2007). These improved health outcomes provide economic benefits at a societal scale through reduced healthcare system costs (Sustainability Victoria 2022).

Not all households can install sufficient solar panels to offset their electricity consumption due to limited roof space; this is particularly the case for townhouses and apartments. The better the energy performance of a home, the smaller the rooftop solar system capacity required to offset the home's electricity demand; homes with our modelled 'climate-ready' level of thermal upgrades require 15 per cent less solar system capacity to meet demand (Climateworks Centre 2023).

At a societal level, energy efficiency ensures that the transition to renewable energy is lowest cost, reliable and equitable for all sections of society. This means improving the fabric of homes so that the need for energy to keep cool or warm is reduced, as many low-income households may have limited disposable income to spend on energy bills. An improved thermal shell can moderate external

temperature swings, so that the indoor temperature stays within a more comfortable and safer temperature for longer, with reduced need for the use of appliances to stay comfortable. Improving the fabric also reduces total and peak electricity demand by enabling occupants to time-shift their energy demand. Time-shifting demand is possible because an insulated home, with good air-tightness, can stop any indoor coolth from leaking out of the home in summer or similarly keep the warmth from escaping in winter. This means that the energy needed for coolth and warmth is reduced and it can be supplied at the optimal time for a renewable grid, even when residents are not at home, reducing evening energy use peaks and allowing for more effective use of home rooftop solar. This will in turn reduce infrastructure network costs.

We recommend that the government play a key role in creating an environment that supports and enables electrification and thermal performance upgrades at scale. This could include the coordination of a suite of initiatives to support energy-efficient renovation decisions from social and community housing providers, owner-occupiers, private landlords and renters, such as:

- **Mandatory disclosure of home energy efficiency ratings at point of sale or lease**, to bridge the information gap between the occupant and the seller or landlord. This empowers the future occupier to understand the energy performance of the home before moving in. To achieve this, the federal government can work with states and territories to implement the National Framework for Disclosure of Energy Efficiency Information, to provide alignment across jurisdictions, supported by complementary measures including funding the training of qualified assessors.
- **Implementing minimum energy efficiency standards for rentals** to increase the performance of rental stock overall. As agreed in the Trajectory for Low Energy Buildings, a national framework for minimum efficiency requirements for rental properties should be established (Commonwealth of Australia 2019). This can build on existing jurisdiction-level policies, such as the ACT Minimum Ceiling Insulation Standard (ACT Government 2023).
- **Introducing higher minimum performance standards of efficient electric appliances for sale across Australia, and for new homes**. This should include space conditioning systems, cooktops and hot water systems. Additionally, the Energy Rating Label standards can be expanded to include other technologies, such as heat pumps.
- **Prioritising vulnerable households in policies** through financial and educational initiatives, as discussed in our response to Term of Reference *(h) solutions to the economic barriers to electrification for low-income households.*
- **Supporting financial products for energy efficiency and electrification measures for owner-occupiers**. This can be achieved through working with banks to normalise energy upgrade requirements for mortgages, enabling households to renovate existing homes to be more energy efficient, and new homes to be built above minimum standards.
- **Creating a one-stop shop for consumers to access accurate information**. A centralised platform with information on the benefits of upgrades, collating available grants and providing contact with knowledgeable suppliers and tradespeople, would empower consumers to make upgrades to their homes. This platform should be created in consultation with the private sector due to their deep knowledge of products, and in collaboration with state and local governments to ensure the platform reaches all households, including groups often deemed ‘hard to reach’.
- **Banning gas connections to all new homes and phasing out the sale of gas appliances** at the rate expected under least-cost decarbonisation pathways.

The cheapest time to electrify a home at both a household and societal level is when building a home. Reducing the number of homes that require renovation in the future to meet higher energy performance standards can be achieved through strengthening provisions in the National Construction Code, such as by introducing voluntary standards for zero carbon homes in the 2025 edition of the Code, before making them mandatory in subsequent updates.

Electric vehicle (EV) charging must also be considered in the transition to all-electric homes. For renters and households without access to home charging, there is a crucial role for wide-scale building retrofitting programs, alongside reforms to market design, planning schemes and the National Construction Code to support EV-readiness. This could include changes to regulation and market rules to support the adoption of two-way chargers, which enable EV batteries to both draw from and provide energy to the grid. This would ensure that charging EVs at home will not overwhelm – and will instead benefit – the grid. Government support for low-income households is particularly important as

they are disproportionately car-dependent (Dodson and Sipe 2008).

Our recommendations draw directly from our upcoming report: *Renovation Pathways: the National Report*, to be published in late 2023 (Climateworks Centre 2023). Our listed recommendations will be discussed in more detail in our report, including modelling and cost-benefit analyses. We are happy to share our report with the Committee once finalised and answer any questions it may generate.

Thank you for taking the time to consider our submission. We would welcome an opportunity to brief the Committee if you would like to explore our responses in further detail.

Yours sincerely,

Gill Armstrong
Senior Project Manager (Buildings)
Climateworks Centre
gill.armstrong@climateworkscentre.org

Josh Solomonsz
Engagement Coordinator (Cities)
Climateworks Centre
josh.solomonsz@climateworkscentre.org

References

ACT Government (2023) *Minimum energy efficiency standards for rental homes*, *Justice and Community Safety Directorate*, accessed 1 September 2023. https://www.justice.act.gov.au/renting-and-occupancy-laws/energy-efficiency-standards-for-rental-homes

ClimateWorks Australia (2020) *Decarbonisation futures: solutions, actions and benchmarks for a net zero emissions Australia*, Climateworks Australia, accessed 12 September 2023. https://www.climateworkscentre.org/resource/decarbonisation-futures-solutions-actions-and-benchmarks-for-a-net-zero-emissions-australia/

Climateworks Centre (2023) [Forthcoming] *Renovation Pathways: the National Report*, Climateworks Centre.

Commonwealth of Australia (2019) *Addendum to the Trajectory for Low Energy Buildings—Existing Buildings*, Commonwealth of Australia, accessed 18 September 2023. https://web.archive.org.au/awa/20210603110920mp_/https://energyministers.gov.au/sites/prod.energycouncil/files/publications/documents/Trajectory%20Addendum%20-%20ADDENDUM%20TRAJECTORY%20FOR%20LOW%20ENERGY%20BUILDINGS_0.pdf.

Dodson J & Sipe N (2008) *Unsettling suburbia: the new landscape of oil and mortgage vulnerability in Australian cities*, Griffith University Urban Research Program Research Paper, accessed 18 September 2023. https://apo.org.au/sites/default/files/resource-files/2008-08/apo-nid449.pdf

Harrington P & Toller V (2017) *Best practice policy and regulation for low carbon outcomes in the built environment*, Cooperative Research Centre for Low Carbon Living, accessed 12 September 2023. https://apo.org.au/sites/default/files/resource-files/2017-04/apo-nid232106.pdf

Howden-Chapman P, Crane J, Chapman R and Fougere G (2011) 'Improving health and energy efficiency through community-based housing interventions', *International journal of public health*, 56(6):583–588.

Knibbs LD, Woldeyohannes S, Marks GB and Cowie CT (2018) 'Damp housing, gas stoves, and the burden of childhood asthma in Australia', *The Medical journal of Australia*, 208(7):299–302.

Sustainability Victoria (2022) *The Victorian Healthy Homes Program: Research Findings*, Sustainability Victoria, accessed 1 September 2023. https://www.sustainability.vic.gov.au/research-data-and-insights/research/research-reports/the-victorian-healthy-homes-program-research-findings