

28 September 2023



To the Senate Standing Committee on Economics,

Thank you for the opportunity to make a submission to the Residential Electrification Inquiry. [Beyond Zero Emissions](#) (BZE) is an independent, solution-focussed think tank creating solutions for a prosperous zero emission future.

BZE has deep expertise and history in the benefits of household electrification, demonstrated through our research:

- [The Buildings Plan](#)
- [Cooling our Home](#)
- [Million Jobs Plan](#)
- [Deploy](#).

Australia's residential building sector accounts for around 24% of electricity consumption and is responsible for around 11% of national greenhouse gas emissions. Full household electrification can enable Australians to enjoy good, comfortable, energy efficient, electrified homes as they face the challenges of a warming climate, while reducing their ongoing energy costs. Household electrification can also expand job opportunities in existing industries and make a significant contribution to our emission reduction targets.

Key recommendations include:

- Set a target to electrify 5 million Australian homes by 2035
- Streamline home thermal retrofits, energy efficiency and electrification by the creation of a National Retrofit Scheme (NRS) as a critical coordination mechanism in a fragmented market of home energy services.
- Incentivise aggregators to offer Managed Energy Services Agreements
- Offer attractive tax incentives and rebates for households to invest in batteries and electricity retrofits.
- Align NDC targets to 1.5°C science based targets
- [Deploy](#) cleantech at scale to cut emissions by 81% by 2030.

I have outlined some information in relation to your inquiry below and would welcome the opportunity to discuss this further.

Yours Sincerely,

Beth Mitchell

Head of Engagement, Beyond Zero Emissions

Long-term reduction of energy price inflation

Residential electrification is a critical solution to driving down energy price inflation in the short and long term.

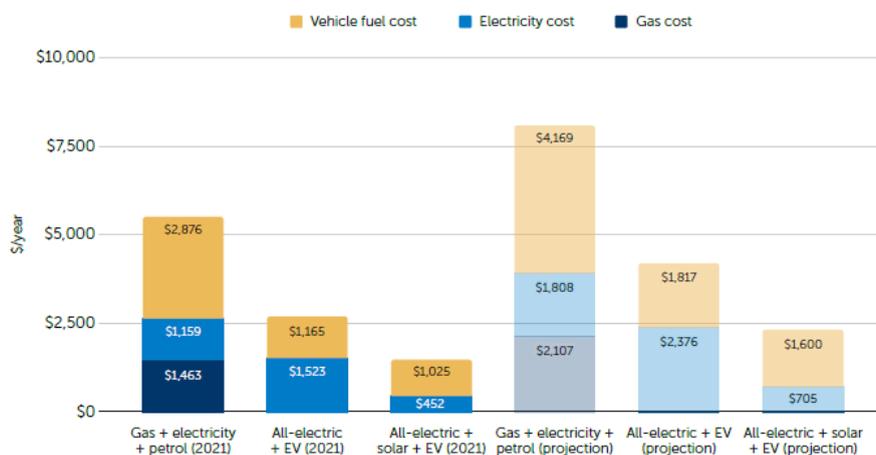
All-electric homes have the twin advantage of being more energy efficient than dual-fuel homes and can be powered by rooftop solar and battery storage technologies. BZE also considers an all-electric home to include electric vehicles (EV) where some or all of the EV charging will occur at the home.

BZE’s National Supergrid report (January 2023) modelled the impact on energy bills of electrification compared to dual-fuel. BZE’s modelling found:

- All-electric homes without solar PV are cheaper than dual-fuel homes
- All-electric homes with solar PV are the cheapest
- All-electric homes are more resilient to energy price inflation.

To illustrate the impact of energy price rises, BZE modelled how price shocks or long term inflation would affect household energy bills. Projected prices were modelled based on statements made by the Treasurer in the October 2022 budget papers which forecasted price increases of 56% in electricity and 44% in gas.

Modelled household energy cost savings as households electrify their energy use

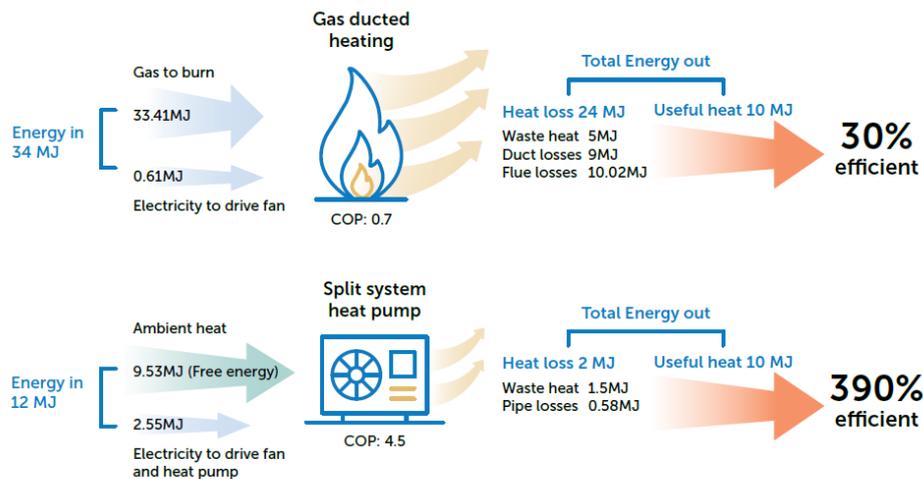


Two sets of energy prices were included in energy cost scenarios. (1) 2021 gas, petrol and electricity prices. (2) ‘Projection’ referring to treasury forecasts of 56% rise in electricity prices and 44% in gas in 2022 October budget papers.

(Source: National Supergrid, BZE, 2023)

The critical technology supporting electrification is a heat pump. Heat pump technologies significantly reduce energy consumption and cost to heat and cool homes. For example, a home which replaces a gas-fired central heating system with reverse cycle air conditioners (RCAC) requires a fraction of the energy and cost to heat the home. In the example shown below, 34MJ of gas is needed compared to only 2.55MJ of electricity from the grid to create the same amount of delivered heat.

Figure 8: Space heating relative efficacy – gas ducted heating vs split system heat pump



The energy bill cost savings of electrification are now well reinforced by analysis from multiple NGOs and state government analysis.

Short and long-term employment opportunities

Residential retrofits including energy efficiency and electrification upgrades, along with the installation of electric technologies in new homes, represent a substantial employment opportunity.

Electrifying Australia’s residential building stock will require 5 million homes to be upgraded and 12 million fixed gas appliances replaced - see our [Deploy](#) report. To deliver the cost savings and emission reductions in line with global emissions targets of 1.5°C of warming, Australia will need to target 100% electrification of homes before 2035. This target represents a substantial employment opportunity in the short-medium term.

BZE’s Deploy report estimated that 87,500 jobs will be required to replace:

- Gas-fired heating systems
- Gas-fired hot water systems
- Gas cooktops and ovens
- Insulation
- Solar panels and Batteries.

Macro-barriers to increasing the uptake of home electrification

- **High upfront costs.** Although electrification and energy efficiency upgrades represent lowest cost long-term investments (and unlike gas products, offer returns on investment), the upfront capital to upgrade to electric remains high. For example, heat pump hot water heaters deliver lowest running costs to supply hot water, however, are the most expensive hot water heating solution up-front. At the time of writing, 170L heat

pumps for hot water were retailing between \$1888-\$5340 while 170L gas hot water systems were retailing from \$1245-\$1950.

- **Shifting from capex to opex.** Financial products such as energy-as-a-service (EaaS) are new financial options that switch costs from upfront to ongoing. The Managed Energy Service Agreement highlighted in the 2020 BZE Million Jobs Plan is discussed later in this document. Unlocking new finance products that are simple to access, competitive and widely available would go a long way to spurring the level of uptake required to meet energy and emissions targets. For example, no upfront cost solar, such as Darebin Council's solar saver scheme, has proven successful in lowering the barrier to entry for low income households to install solar. Expanding this finance solution to all electrification products could rapidly increase uptake.
- **Lack of skilled and knowledgeable installers.** There are insufficient skilled electricians, plumbers and installers of electrification products and other energy efficiency products (such as insulation or draught proofing) in the market to meet large scale deployment for electrification.

From a consumer standpoint, finding skilled installers is difficult, leading to less than satisfactory outcomes such as poor installation of hot water heat pumps, oversized (and overpriced) RCAC and unnecessary electrical upgrades. A lack of education of plumbers on electrical alternatives, for example, also impacts consumer take up.

- **Rentals and split-incentives.** A third of households rent and therefore have very low agency or no agency to affect property upgrades. There is little incentive for landlords to invest in electrification upgrades. Even when a landlord and tenant are both committed to making an upgrade, unravelling the problem of split-incentives remains a persistent barrier.
- **Poor household energy literacy and awareness.** Consumers in general have very poor energy literacy. Poor energy literacy can lead to poor investments and missed opportunities. Energy labelling has gone a long way to helping consumers select more efficient products. This is advantageous when replacing a product or selecting a new fridge but does not help a consumer switch to an entirely new product such as choosing an electrical water heating solution instead of gas.
- **Consumer sentiment towards gas-products.** Many Australian households are wedded to their gas-products and are strong in their conviction to cook with gas or be heated in their home by gas. In these cases, incentives and subsidies will be ineffective at converting these homes to upgrade to all-electric. [Energy Consumers Australia June 2022 Sentiment Survey](#) shows that household consumers of gas are highly satisfied: 70% of households thought gas was good value for money, 80% were positive about gas service and 68% were satisfied with the level of competition.

The gas industry has been, and continues to be, highly successful in selling gas products to consumers. The same level of marketing does not exist for new electrical alternatives. This continues to reinforce many Australian households' preference for gas.

- **Lack of Aggregators.** Australian households need to navigate a highly diverse and fragmented market. This, coupled with poor energy literacy, means households may face difficulties selecting the best products for their needs. Aggregation will be instrumental to rapid uptake of electrification - coordinating home upgrades with a one-stop-shop model is likely to be the most efficient deployment model.
- **Insufficient electrification incentives.** Electrification incentives are presently insufficient to achieve mass market uptake of electrification.
- **Supply chain bottlenecks.** Without sovereign manufacturing, Australia will be dependent on overseas markets to supply affordable electrification products.
- **Low health awareness.** The health impacts of gas combustion inside homes are very serious. For example, cooking with a gas stove has been likened to living with a “pack a day smoker” and causes about 1 in 12 child asthma cases. The general public’s understanding of these health impacts is very low compared to other health issues such as smoking.
- **Expensive network and household electrical upgrades.** In pursuit of 100% residential electrification, distribution networks and a number of household switchboards will require upgrades. Electrical upgrades can be very expensive and undermine investment in electrification. In general, this issue is about having enough electrical supply to power electrification upgrades. When insufficient supply exists, the upgrade is born by the consumer. When these upgrades occur in front of the meter, the cost is often disproportionate to the supply requirements.

For example, a council may wish to install a new public EV charging station that exceeds existing network capability; to complete the installation, they will be required to pay for the substation upgrade. However, due to the fact that substations come in defined sizes and upgrades can incur a steep cost regardless of the additional energy needed by the council. This unfairly places the investment burden on a few users and thereby deters critical investment.

In the case of households, switchboard upgrades tend to represent a hidden cost that can push households budgets beyond what is affordable. For example, a new \$1800 induction cooktop may require a new isolation circuit to be installed which can typically cost \$2000 and thereby double the investment cost.

Creation of a National Retrofit Scheme

To drive better energy performance in the residential sector, **BZE recommends the creation of a National Retrofit Scheme (NRS)** as a critical coordination mechanism in a

fragmented market of home energy services. This will streamline home retrofits by empowering all consumers to adopt energy efficient technologies.

BZE's [Million Jobs Plan](#) (MJP) proposes a target of 2.5 million deep energy retrofits to existing homes over 5 years – this equates to 500,000 home renovations per year, with priority given to low income groups. The average cost of this work was calculated as \$25,000 to \$30,000 per home in 2020. Our initial analysis showed that in most cases this cost would be paid back in under 10 years through cheaper energy bills.

The Federal Government can enhance the rapid deployment of retrofits by providing concessional or low interest finance to energy service providers to deliver against energy efficiency targets (see below). We propose that under a NRS, householders receive whole-of-house energy retrofit through a Managed Energy Service Agreement (MESA). In this model, MESA providers enter contracts with households to deliver retrofits in return for a set monthly fee.

The MESA provider is responsible for engaging relevant contractors to implement the retrofits. Co-ordinating the market via a NRS will help streamline adoption of technologies to drive energy performance improvements. A NRS would coordinate the network of organisations involved, including:

- Local coordination partners
- Demand aggregators
- Accredited installers
- Accredited manufacturers
- Finance organisations
- Certification bodies

Box 5: How a government backed Managed Energy Services Agreement (MESA) would work

With a MESA, household energy because a service with a flat fee, like many mobile phone or broadband contracts.

The householder enters into a contract with a MESA provider.

The contract guarantees a level of energy service for an agreed price.

The householder pays a set monthly fee to the MESA provider, which is likely to be lower than the householder’s historic energy bills.

The MESA provider:

- engages a Contractor to carry out energy retrofits and maintain equipment throughout the contract period
- pays for retrofits by accessing cheap government finance
- assumes responsibility for meeting guaranteed energy performance, ensuring the Contractor addresses any problems
- assumes responsibility for the on-going relationship with the electricity retailer, including paying bills.



Longer term benefits include:

- **Lifting GDP.** Independent economic analysis of BZE’s 2020 Million Jobs Plan by Chris Murphy (former Treasury economist) found that retrofitting 2.5 million homes in 5 years would lift GDP by 0.19% and real after-tax wages by 0.31%.
- **Help eliminate energy poverty** by improving access to the cost of living benefits that come through electrification.
- **Human Health:**
 - **Temperature:** A cool refuge is a key protective factor during a heatwave. It is well established that heat waves kill more Australians than any other weather event ([NSW Health](#)). Heat related illnesses are also costly to the healthcare system. A [WA study](#) found that 4.6% of Emergency Department visits were heat related, costing \$2.9 million over the study period. The Victorian “[Healthy Homes](#)” study examining the benefits of retrofits to improve the thermal efficiency of homes found: “*Cost-benefit analysis indicated that the upgrade would be cost saving within 3 years – and would yield a net saving of \$4,783 over 10 years – due to savings in both energy and*

health. Savings were heavily weighted towards healthcare: for every \$1 saved in energy, more than \$10 is saved in health.” ([Sustainability Victoria](#), 2023)

- **Gas in home:** Gas appliances cause nitrogen dioxide and carbon monoxide. The Australian Journal of General Practice states *“The current suggestion to ‘electrify everything’ on climate grounds will have substantial health benefits if it leads to the reduction in gas use in people’s homes. As 2.7 million Australians have asthma, even a small reduction in incidence or severity will be of great value. With highly efficient reverse-cycle air conditioning for heating and induction stoves for cooking, there is no ongoing need for new houses to have a connection to a gas supply, and some jurisdictions are planning gas-free suburbs. The problem of CO poisoning is a diagnostic challenge that needs greater awareness by clinicians to avoid preventable illness and deaths.”* (Australian Journal of General Practice Volume 51, Issue 12, December 2022)

Case study of an Aggregator

Energiesprong: deep energy retrofits with no upfront costs.

Energiesprong is an approach to whole house refurbishment that began in the Netherlands and is now spread across Europe, into the UK and also the US. After an Energiesprong retrofit, a home generates the total amount of energy required for its heating, hot water and electrical appliances. The retrofit comes with a 30-year performance warranty and residents pay no upfront costs. Residents pay for the cost of the retrofit and on-going energy supply through a monthly energy plan which costs no more than their previous bills. So far a few thousand homes have had an Energiesprong refurbishment, but the company believes that, by scaling up and standardising its model, millions of homes will be able to benefit from a deep energy retrofit at no extra cost. (Source: BZE Million Jobs Plan, 2020).

“ Independent Global Energiesprong Alliance market development teams work with regulators to tune policy and regulation, and with banks to create financial arrangements to make a viable path to scale. By creating these market contexts while simultaneously brokering initial pilot projects and, subsequently, large volume retrofit deals (1000’s), the momentum needed for stakeholders to act simultaneously is created. This entices suppliers to invest in off-site manufacturing of the components needed for such house makeovers. Mass customisation and industrialisation are key in getting to a new quality and cost standard.” ([Energiesprong Global Alliance](#), 2023.)

With local adaptation, the Energiesprong model could create a foundation for local aggregators to simplify electrification for households. BZE recommends the government trial an Energiesprong-style model, adapted to Australian conditions, which includes incentivising aggregators to offer Managed Energy Services Agreements.

Optimal timeline for household electrification

The optimal time to electrify a home is when it is being built and electrification is designed into the home. Banning gas connections into new residential areas can accelerate electrification. There are no barriers to electrification today and, coupled with rooftop solar and DER, Australia can start building stable renewable electricity networks that are smart and can make the best use of our electricity resources.

To reach 82% renewables by 2030, Australia needs to start now. Household electrification coupled with rooftop solar and batteries can provide a significant uplift to achieving 82% renewables target. People are choosing to electrify their homes already through rapid uptake of rooftop solar and will continue to do so as more homes see the benefits of electrification.

Household energy independence

Household electrification with the inclusion of solar and batteries can improve energy independence for Australian households. This could act as a buffer against price volatility, for example price spikes in fossil fuels as a result of the war in Ukraine. Electrification with solar and batteries can also support energy security for Australian households in the case of extreme weather events, for example in South Australia in 2016 storms took out 22 transmission towers causing widespread blackouts. Australians will increasingly face such extreme weather events: energy independence is a climate adaptation that improves community resilience.

Many households are not reaping the full benefits of their solar system, selling their surplus solar cheaply and buying it back at peak times at a much higher cost. Offering financial incentives such as tax deductions or rebates for batteries could help households with the upfront costs, increase energy independence and allow households to participate in virtual power plants.

Virtual power plants (VPPs) can play a large role in adapting to a more distributed electricity system. For example, Origin Energy is expanding its Loop VPP from [200MW to 2 GW](#), and increased household batteries could make this happen faster.

Finally, it is critical that thermal efficiency/energy efficiency is addressed alongside electrification to increase the resilience of homes to extreme temperature conditions in summer and winter and to maximise cost savings. Large amounts of energy are used in heating and cooling homes, and thermally inefficient homes leak energy, costing more to heat and cool.

