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Institute for Energy Economics and Financial Analysis

How efficient appliances could ease Tasmania's cost of living

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Key Findings

Tasmanians could collectively save $146 million over the lifetime of their heating, hot water and cooking appliances for every year that all new appliances installed are efficient and all-electric, rather than inefficient electric, gas or LPG-fuelled.

An all-electric Tasmanian home could cut their bills by nearly $1,000/year by replacing worn out inefficient electric appliances with efficient electric ones, recouping their investment in four years.

A typical gas-connected Tasmanian home could save nearly $1,300/year by replacing end-of-life gas appliances with efficient electric ones, recouping their investment in under two years.

The savings could be amplified further by improving the thermal efficiency of Tasmanian homes, accelerating the deployment of consumer energy resources, and unlocking the potential for demand flexibility.

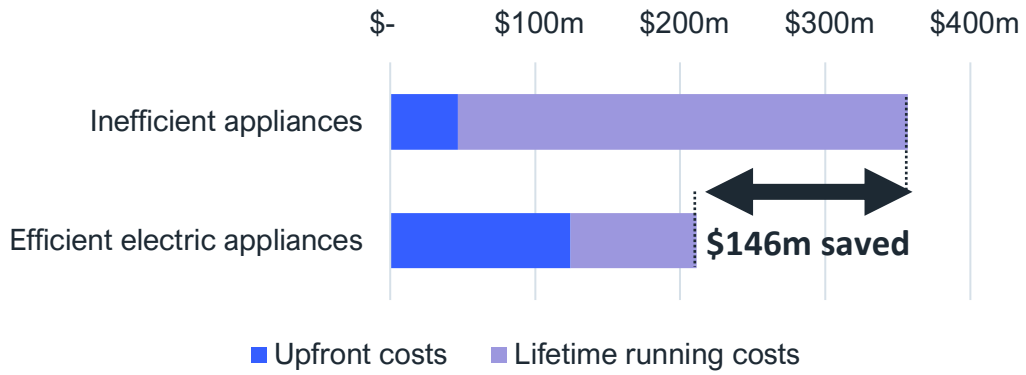
Executive Summary

Despite enjoying lower electricity rates than most of the National Electricity Market, Tasmanians on average pay higher electricity bills than other states and territories. Tasmanian homes are typically thermally inefficient, and often rely on inefficient resistive electric appliances for space heating and hot water. These are cheaper to purchase, but much more costly to run than efficient alternatives.

While most Tasmanian homes are all-electric, around 5% are connected to mains gas, and an additional 14% use liquefied petroleum gas (LPG). For these households, gas is no longer providing the cost-competitive alternative it once did. Electrification is highly cost-effective for gas consumers. However, it does present risks for gas distribution networks, even under a consumer-driven switch. It will be critical for the Tasmanian government to work with Tas Gas Networks to manage the phasedown of residential portions of the network in a way that minimises impacts to customers.

IEEFA looked at the projected number of resistive electric, mains gas and LPG appliances installed per year in Tasmania. We found that over the lifetime of those appliances, households are locking in $146 million in additional costs each year compared with if they were switched to efficient, electric appliances.

Figure 1: Total lifetime savings per year – Efficient electric appliances



If all resistive electric, mains gas and LPG appliances in Tasmania were converted to efficient electric appliances, a net 771 gigawatt-hours of electricity could be saved per year, which is a 6.3% reduction on state-wide electricity demand.

Requiring all new appliance sales to be efficient and electric represents one of the most economical options to reduce energy costs for Tasmanian households. It could avoid billions in long-term locked-in costs, and it would present an equitable solution for renters, who often cannot access home energy upgrades.

While this could lead to significant cost-of-living savings on its own, Tasmania could amplify these actions by prioritising improvements to the thermal efficiency of Tasmanian homes, accelerating the

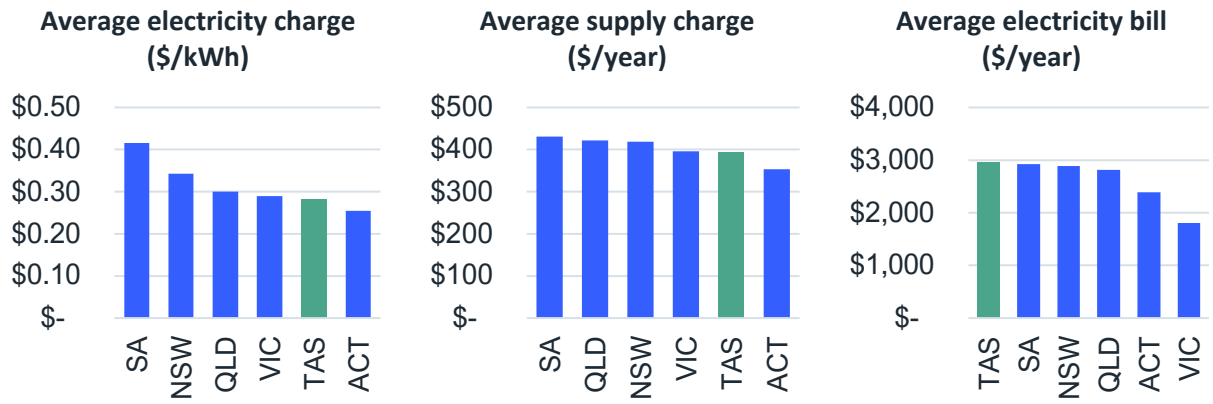
deployment of rooftop solar and other consumer energy resources, and working with other governments to unlock the potential for residential demand flexibility.

Tasmanian households pay unusually high energy bills

Tasmanian retail electricity rates are generally competitive compared with other states and territories.[1] However, Tasmanian homes pay higher total electricity bills than mainland homes (see Figure 2).[2]

This is partly driven by the higher need for heating in Tasmania's cool climate and its predominantly all-electric housing stock. However, poorly insulated houses and a stock of low-efficiency appliances make keeping Tasmanian homes comfortable more expensive than it needs to be.

Figure 2: Electricity rates in Tasmania are competitive, but total bills exceed the rest of the National Electricity Market



Source: IEEFA analysis based on St Vincent De Paul Tariff Tracking project and analysis of market rates from government comparison websites.

While most Tasmanian homes are all-electric, those that consume mains gas are at a particular disadvantage. Retail gas plans in Tasmania are generally uncompetitive compared with mainland rates. Aurora Energy customers in particular are now paying more for their gas than the average customer in any other state or territory.[3]

Some Tasmanians also rely on bottled LPG (propane) to meet some of their energy needs. These costs typically are not included in most analyses of energy bills. However, LPG is a more expensive

[1] Office of the Tasmanian Economic Regulator. Comparison of Electricity and Gas Prices Available to Small Customers in Australia. October 2023. Page ii.
[2] AEMC. Residential Electricity Price Trends 2021. 25 November 2021. Page 17. Consistent with findings from St Vincent de Paul's Tasmanian Energy Prices 2023 in comparison with other state tariff tracking reports.
[3] Office of the Tasmanian Economic Regulator. Comparison of Electricity and Gas Prices Available to Small Customers in Australia. October 2023. Page 29.

fuel than reticulated gas, which itself is more expensive than electricity when used for efficient modern appliances.[4]

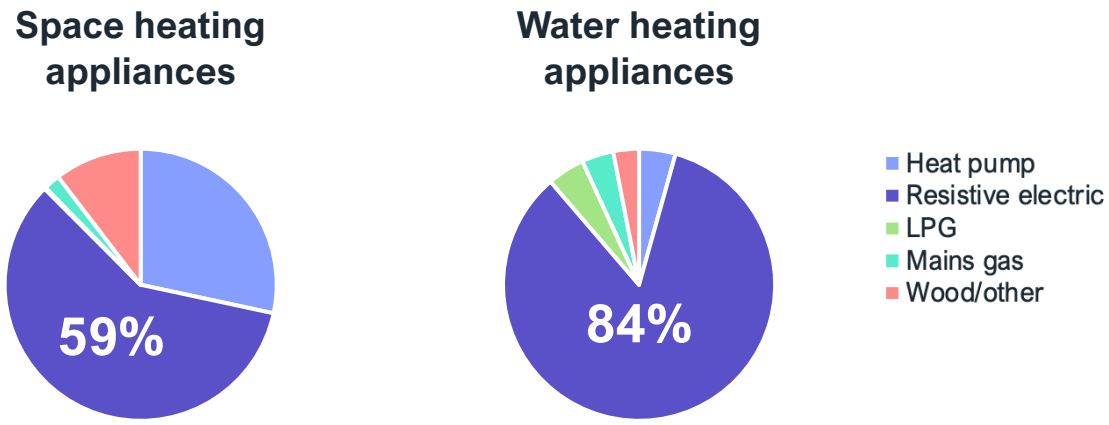
Most Tasmanian homes are all-electric, but inefficient

While several states and territories are planning for their transition to all-electric homes, the majority of Tasmanian homes are already all-electric. An estimated 80% of homes consume no mains gas or LPG.[5]

There are no clear estimates on the average thermal performance of Tasmania's existing housing stock. However, estimates for Victoria suggest an average energy star rating of 1.8 out of 10.[6] This may well be lower in Tasmania where the implementation of energy efficiency standards has lagged other states and territories, and the rate of new home builds is slower.[7,8] Coupled with a cool climate, it is particularly expensive to keep Tasmanian homes comfortable.

The matter is made worse by the dominance of inefficient electric appliances in Tasmanian homes. This includes resistive electric space heaters and resistive electric hot water units (Figure 2).

Figure 3: Resistive electric appliances make up the majority of electric appliances in Tasmania



Source: EnergyConsult (2022).

[4] Based on a quote of $135 per 45-kilogram (kg) bottle (Origin Energy), which with an energy density of 46 megajoules (MJ) per kilogram (Energypedia) equates to $65 per gigajoule (GJ) compared to an average gas price of $47.95 (analysis of SVDP 2023).
[5] Based on an assumed 260,523 homes in 2024 (EnergyConsult 2021), of which 13,700 use mains gas and 36,200 use LPG (Department of State Growth 2023).
[6] Sustainability Victoria. Energy Efficiency Upgrade Potential of Existing Victorian Homes. December 2015. Page 6.
[7] From 2003 Tasmania followed national minimum efficiency standards, while several states implemented stricter standards (e.g. VIC, SA). 6-star minimum standards were delayed in Tasmania from 2011-2013 (Torple Energy Ratings). Tasmania is deferring an upgrade to 7-star minimum standards until 2025 (Transformed).
[8] Tasmania exhibits the slowest population growth in Australia (ABS), which slows the rate at which new dwellings, with higher minimum efficiency standards, are built.

Alongside inefficient electric heating, Tasmanians are also the largest consumers of firewood per capita in Australia. While this report does not explore the potential impacts of switching from wood heating to efficient appliances, the savings may also be significant, as wood heating is inefficient and more than 60% of Tasmanian firewood is purchased (as opposed to self-collected).[9]

Inefficient electric appliances are typically cheap to purchase. However, modern efficient appliances far outperform them in terms of energy efficiency. The most efficient appliances for space and water heating rely on heat pumps, which can have effective efficiencies of well over 300%, compared with a maximum of 100% for resistive electric appliances.[10] For cooking, induction cooktops are about one third more efficient than older ceramic cooktops.[11]

This typically means that savings on running costs over the lifetime of an efficient appliance will more than pay back its higher upfront cost.

IEEFA estimates gross bill savings of $999/year for a Tasmanian household that replaces its resistive electric appliances with efficient alternatives.[12]

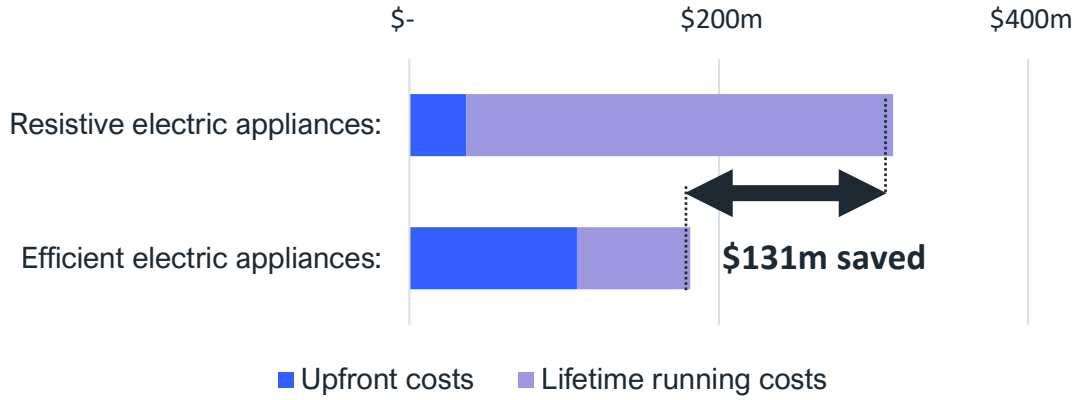
If all these were replaced at end-of-life, the marginal investment would be around $4,022, which would be paid back in 4 years.[13]

Appliance purchases are long-term investments. The full impact of the decision to purchase an efficient appliance versus an inefficient one can be measured by comparing the lifetime costs (including upfront and ongoing running costs) across both types of appliances.

We estimate that around 39,000 inefficient electric appliances are installed in Tasmanian homes each year. Over the lifetime of those appliances, Tasmanian consumers will end up spending $313 million in lifetime costs.[14] If efficient appliances were installed instead, the lifetime costs would drop to $182 million – saving households $131 million over the lifetime of their appliances (Figure 4).

[9] NRM South. Firewood.
[10] IEEFA analysis of consumer reverse-cycle air conditioners and heat pumps available from major online retailers in 2023 found an average coefficient of performance of 3.9 and 4.2 respectively.
[11] Renew. Household Fuel Choice in the National Electricity Market. July 2018. Page 51.
[12] Assuming 2,700 kilowatt-hours (kWh) per year on resistive heating, and 2,730kWh/year on resistive water heating.
[13] For most households this would likely be split into individual investments when each appliance retires.
[14] See Appendix for methodology.

Figure 4: Total lifetime savings per year – Efficient electric vs inefficient electric appliances



Source: IEEFA analysis drawing on EnergyConsult (2022), and energy prices from St Vincent De Paul (SVDP) (2023). For each year efficient electric appliances are installed in place of inefficient electric appliances, Tasmanians would save $131 million over those appliances' lifetimes. Inefficient appliances are assumed to be resistive electric space and water heaters, which can be replaced by heat pumps.

These costs accumulate for each year consumers continue to purchase inefficient appliances.

While the actual savings may vary with future changes in the cost of electricity, switching to efficient electric appliances will always result in far greater cost savings to consumers than a decrease in electricity prices alone.

IEEFA estimates that fully replacing Tasmania's resistive electric appliance stock with heat pump-based appliances would save 834 gigawatt-hours (GWh) per year, or around 7% of Tasmania's current electricity demand.[15]

Gas consumers are particularly disadvantaged

Approximately 13,700 homes are connected to mains gas in Tasmania.[16]

Tasmanians were first able to connect to mains gas from the mid-2000s, at a time when domestic prices were very low, and gas appliances offered a financially attractive alternative to inefficient electric appliances.[17]

Tasmania is reliant on a single physical link with Victoria to deliver its gas supply. This previously enabled Tasmania to access low-cost gas from Bass Strait reserves.

[15] Based on a total electricity demand of 12,333GWh in 2021-22 (DCCEEW 2023).
[16] Department of State Growth. Tasmanian Future Gas Strategy. 7 November 2023. Page 5.
[17] Ibid. Page 13.

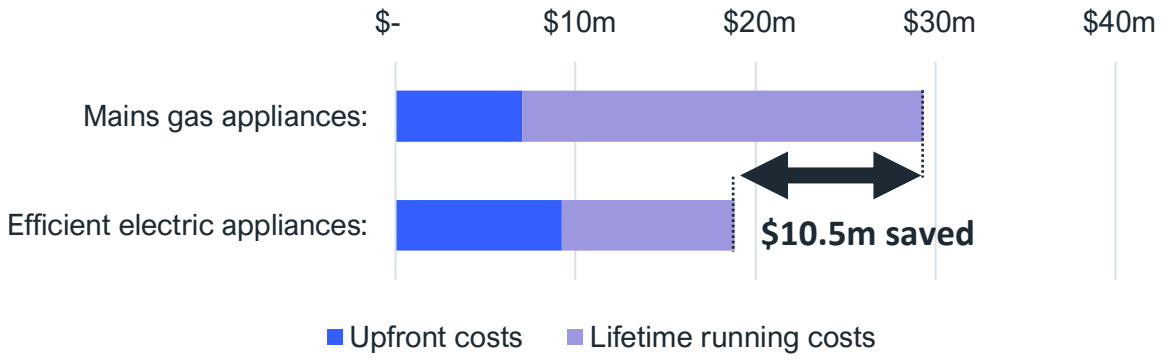
However, the underlying economics of gas have shifted. Bass Strait gas reserves are depleting, and domestic gas prices are increasingly linked to international markets. This has left gas consumers at a particular disadvantage. Over the past five years in particular, the consumer price index (CPI) for gas and other household fuels has increased faster than for electricity.[18]

IEEFA estimates gross bill savings of $1,250/year for a Tasmanian household that replaces its gas cooktop, heater and water heater with efficient electric alternatives.

If all these were replaced at end-of-life, the marginal investment would be around $2,360, which would be paid back in 1.9 years.[19]

We also estimate that around 4,300 gas appliances are installed annually. This incurs $29.3 million in lifetime costs for consumers, compared with $18.8 million if these were converted to efficient electric appliances; a saving of $10.5 million (Figure 5).[20]

Figure 5: Total lifetime savings per year – Efficient electric vs gas appliances



Source: IEEFA analysis drawing on EnergyConsult (2022), and energy prices from SVDP (2023). For each year efficient electric appliances are installed in place of gas appliances, Tasmanians would save $10.5 million over those appliances' lifetimes.

As the overall volumes of residential gas are low in Tasmania, the added electricity load from electrification would be minor. We estimate that fully electrifying residential gas in Tasmania would ultimately add 50.2GWh/year, or 0.4% of Tasmania's current electricity demand.[21]

[18] IEEFA. Response to senate inquiry on residential electrification. 28 September 2023. Page 3.
[19] For a household replacing one gas cooktop, one non-ducted gas heater and one instantaneous gas water heater. For most households this would likely be split into individual investments when each appliance retires.
[20] See Appendix for methodology.
[21] Based on a total electricity demand of 12,333GWh in 2021-22 (DCCEEW 2023).

LPG users could also save by switching

Separately to mains gas consumption, around 36,200 Tasmanians consume bottled LPG (propane).[22] LPG is most commonly used as a cooking fuel, but can also be used for water and space heating. Bottled LPG is popular in regions without access to reticulated gas (as much of Tasmania is).

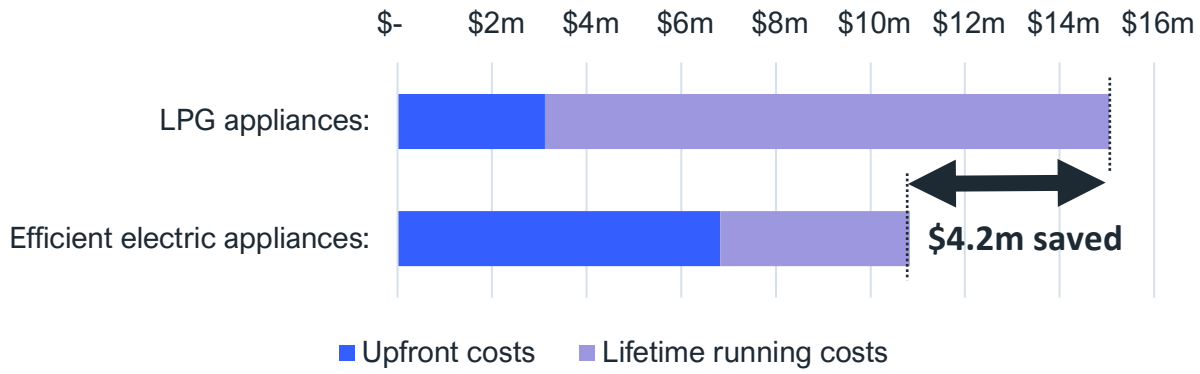
LPG is around 36% more expensive than reticulated gas, retailing for approximately $65 per gigajoule (GJ).[23]

Data on actual LPG usage is poor, with wide disagreement between commonwealth energy statistics and EnergyConsult's Residential Baseline Study.[24,25]

For the following analysis, IEEFA has assumed that 80% of Tasmanian LPG users have an LPG cooktop, and that other LPG appliances are as reported in the Residential Baseline Study.

This implies an estimated 3,000 new LPG appliances installed annually. This incurs $15.1million in lifetime costs for consumers, compared to $10.8 million if these were converted to efficient electric appliances; a saving of $4.2 million (Figure 6).

Figure 6: Total lifetime savings per year – Efficient electric vs LPG appliances



Source: IEEFA analysis. For each year efficient electric appliances are installed in place of LPG appliances, Tasmanians would save $4.2 million over those appliances' lifetimes.

The expected additional electricity load if all LPG users were to switch to efficient electric appliances would be around 13.4GWh/year, or 0.1% of Tasmania's current electricity demand.[26]

[22] Department of State Growth. Tasmanian Future Gas Strategy. 7 November 2023. Page 26.
[23] Based on a quote of $135 per 45kg bottle (Origin Energy), which with an energy density of 46MJ/kg (Energypedia) equates to $65/GJ compared with an average gas price of $47.95 (analysis of SVDP 2023). Note: households that only use LPG for cooking may use smaller bottles at a higher $/GJ rate.
[24] DCCEEW. Australian Energy Update 2023: Table F. 29 September 2023.
[25] EnergyConsult. 2021 Residential Baseline Study for Australia and New Zealand for 2000 to 2040. 11 November 2022.
[26] Based on a total electricity demand of 12,333 GWh in 2021-22 (DCCEEW 2023).

What does electrification mean for networks?

Changes in household fuel usage may have implications for the infrastructure used to deliver energy to the home. This includes electricity and gas distribution networks.

The full potential added electricity demand from electrification of gas and LPG loads in Tasmania is small, at 64GWh/year or 0.5% of Tasmania's current electricity demand. This could be more than offset by the move from resistive to efficient electric appliances discussed above.

As such, Tasmania's distribution network, operated by TasNetworks, is not expected to see significant impacts from residential electrification. TasNetworks already supports a predominantly all-electric building stock, and at current times of peak demand, utilises on average 46% of its full capacity.[27]

By comparison, residential electrification has a significant impact on gas distribution networks. Residential customers generally form a large part of gas distribution networks' customer base.

Previous IEEFA analysis found that Victorian gas distribution networks may face a challenge in recovering the sunk costs of their network investments from a diminishing customer base, which could leave them with unrecovered costs.[28]

However, as the savings to consumers would far outweigh these unrecovered costs, a managed plan to wind down gas distribution networks is in the best interests of the energy system as a whole.

Tasmania has one gas distribution network, Tas Gas Networks. While only a quarter of its demand is from residential customers, it operates extensive network assets across Tasmania's main cities. It has the capacity to serve 60,000 customers, though only 13,700 are actually connected.[29]

This low utilisation rate implies that individual customers may be paying for a disproportionately high share of network costs. This could explain why network charges account for 63% of Tasmanians' gas bills, which is the equal highest of any state and territory alongside Queensland.[30]

Most of this network was rolled out from the mid-2000s, making Tasmania's gas distribution network one of the youngest in the country. Gas distribution assets are typically built with an expected lifetime of up to 80 years.[31]

[27] AER. Electricity network performance 2023. Electricity DNSP Operational performance data 2006-22 – Utilisation. 7 July 2023.
[28] IEEFA. Managing the transition to all-electric homes. 2 November 2023. Page 5.
[29] Department of State Growth. Tasmanian Future Gas Strategy. 7 November 2023. Page 23.
[30] AER. State of the Energy Market 2023. October 2023. Page 223.
[31] AER. Regulating gas pipelines under uncertainty. November 2021. Page 25.

Tasmania's gas distribution network is not fully-regulated, and public data on its asset and cost base is limited. However, its young age and relatively low utilisation present a risk that if consumers electrify, increased costs could be passed on inequitably to the remaining customer base.

It will be important for decision-makers to understand the impacts of electrification on the gas network, and ensure that networks are wound down in a managed way that protects all consumers. This includes commercial and industrial customers who draw the majority of gas from the network.

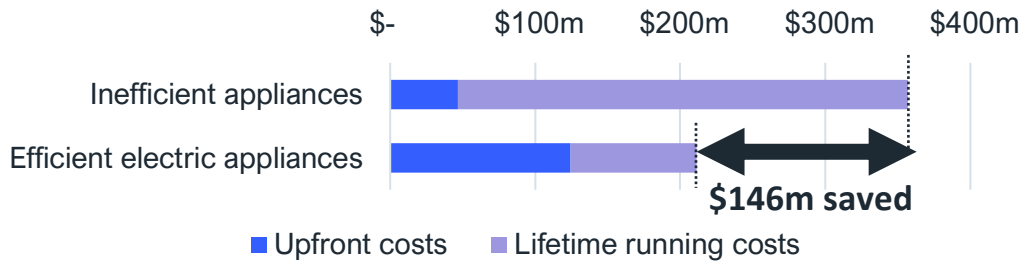
While some mainland gas distribution networks have explored hydrogen or biomethane as alternative solutions, IEEFA analysis found these were not economically viable for households, and faced technical or supply constraints.[32] These gases are much more likely to be reserved for hard-to-abate use cases.

Recommendation: The Tasmanian government should work with Tas Gas Networks to manage the phasedown of residential portions of the network, minimising impacts on the remaining consumers.

Efficient electric appliances are an economical, equitable way to cut the cost of living

The analysis in this briefing note focuses on the costs avoided by converting new sales of inefficient appliances to efficient electric appliances in a given year. Across gas, LPG and electric appliances, the total lifetime savings for consumers could add up to $146 million for each year that new appliances are transitioned to be efficient and electric (Figure 7).

Figure 7: Total lifetime savings per year – Efficient electric appliances



Source: IEEFA analysis. For each year efficient electric appliances are installed in place of inefficient electric, gas or LPG appliances, Tasmanians would save $146 million over those appliances' lifetimes.

Conversely, this represents the cost of delayed action for each year that Tasmanians continue to purchase inefficient, gas or LPG appliances.

[32] IEEFA. 'Renewable gas' campaigns leave Victorian gas distribution networks and consumers at risk. 17 August 2023.

The costs accumulate over time. For example, if there was no change in appliance sales trends over the next ten years, Tasmanian consumers may end up more than $1.4 billion worse off than if they had switched to efficient appliances.

> **If there was no change in appliance sales trends over the next ten years, Tasmanian consumers may end up more than $1.4 billion worse off than if they had switched to efficient appliances.**

Ensuring that all new appliance sales in Tasmania are electric and efficient would mean that existing inefficient appliances are phased out at their natural end-of-life, which is the most economical point of an appliance's lifecycle to switch.

It also has the advantage that it would apply to appliances purchased for rental properties. Renters make up 29% of households in Tasmania and typically face greater barriers to upgrade.[33] Tenants do not get to choose their household appliances, and landlords currently have no incentive to purchase high-efficiency appliances when old appliances break down.

While the upfront cost to high-efficiency appliances may present a barrier to some households, this barrier can be overcome via zero-interest loans, such as Tasmania's existing Energy Saver Loan Scheme. All of the upgrades discussed in this report are eligible under the current scheme.[34]

Key recommendation: Require new appliance sales in Tasmania to be efficient and electric.

Further actions can amplify the savings

Ensuring new appliances are efficient and electric is one of the most impactful actions Tasmania could take to reduce energy bills, but other key actions can amplify the savings even further.

For instance, all of the benefits discussed in this report assume no improvements are made to the thermal shell of Tasmanian homes. However, with a likely average energy star rating of below 1.8, there is a significant scope for even greater savings.

Analysis by Climateworks Centre found that 'quick fix' and 'modest' upgrades including draught sealing, insulation and window shading were highly cost-effective for Australian homes. A full 'climate resilient' upgrade delivered savings of over 14.6MWh per Tasmanian home per year.[35]

[33] ABS. Housing Occupancy and Costs. States and Territories. 25 May 2022.
[34] Department of State Growth. Energy Saver Loan Scheme.
[35] Climateworks Centre. Climate-ready homes: Building the case for a renovation wave in Australia. 6 December 2023. Page 34.

The Tasmanian government could improve housing thermal efficiency by introducing further rebates for home energy upgrades, introducing minimum energy efficiency standards for rental properties, and bringing forward the requirement for new homes to meet 7-star minimum ratings.

Recommendation: Prioritise improving the thermal efficiency of Tasmanian homes.

Just under one in ten Tasmanian households already use rooftop solar.[36] While this is growing, it is still well behind the national average of one in three.[37] Households that add rooftop solar can achieve even greater savings than those estimated in this report, as they can access low-cost power in the daytime, resulting in lower electricity bills than for the average household.

While household batteries are currently expensive, they have the potential to allow consumers to maximise consumption of their rooftop solar, and the potential benefits of distributed storage in Tasmania's energy system warrants further investigation. In future, it is likely that electric vehicles will be able to function as a battery on wheels. These distributed energy resources can reduce energy bills for all Tasmanians – not only for those who own the solar or storage – by reducing system costs.[38]

Recommendation: Accelerate the deployment of rooftop solar and other consumer energy resources (CER).

Separately or in addition to batteries, electric hot water systems can function as a form of energy storage. If new heat pump hot water systems were equipped with smart controls that respond to rooftop solar output, or peak/off-peak tariffs, their running costs would be reduced further, as they could be heated at times when electricity prices are low. These benefits would be in addition to the savings calculated in this report.

Australia has existing standards covering some types of CER, but this does not include smart controls for hot water systems. Previous IEEFA reports have proposed that the management of CER standards should be centralised. Tasmania could work with other governments to establish a technical authority on CER standards, to help unlock flexible demand from devices such as hot water systems.[39]

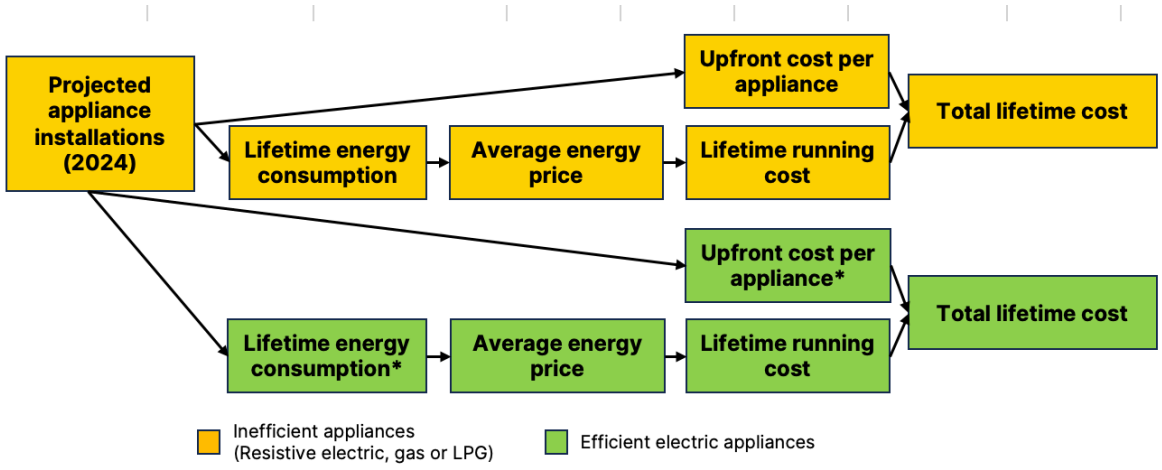
Recommendation: Work with other governments to establish a technical standards authority for CER and unlock the potential of demand flexibility.

[36] More than 24,600 (Tasmanian Safer Solar. Solar Panels in Tasmania. 13 April 2023) of approximately 260,000 homes (EnergyConsult 2022)
[37] CleanTechnica. Nearly 1 in 3 Homes in Australia Covered In Solar Panels. 2 February 2023.
[38] See IEEFA. DER could provide $19 billion economic boost by 2040. 15 February 2024.
[39] See IEEFA. Growing the sharing energy economy. 13 October 2023.

Appendix: Methodology for lifetime cost savings

Figure 8 shows the methodology for calculating the total lifetime cost of inefficient versus efficient appliances for this report. Key assumptions and calculations are explained in Table 1.

Figure 8: Methodology for calculating lifetime cost savings in this report



**Where the expected lifetime of an inefficient and an efficient appliance differed, the efficient appliance's upfront cost and lifetime energy consumption were adjusted upwards proportionally.*

Table 1: Explanation of key assumptions and methodologies

Projected appliance installations	• Drawn from underlying assumptions from EnergyConsult (2015). • Sales trends were extrapolated and scaled to calibrate them to total appliance stocks reported in EnergyConsult (2022).
Upfront cost per appliance	• Averaged from a desktop review of retail appliance costs and installation costs from retailers' websites, including Bunnings and Appliances Online. Excludes any government rebates.
Lifetime energy consumption	• Expected lifespan drawn from assumptions in EnergyConsult (2022). • Average energy consumption per appliance drawn from EnergyConsult (2022), except for resistive electric appliances as EnergyConsult data appeared unusually low, and did not reconcile with DCCEEW (2023) totals. • 2,700kWh total heating load for an average Tasmanian household was estimated based on analysis of summer versus other loads for a 2-3 person Tasmanian household using data from Frontier Economics (2021). 78% was assumed to be resistive heating based on appliance stocks in EnergyConsult (2022). • 3,555kWh/year consumption of a medium-large hot water unit was estimated based on modelling by Alan Pears (2024) of a unit heating 125 litres per day to 60°C for Hobart monthly water temperatures. Consumption for small units was adjusted proportionally based on original EnergyConsult (2022) data.
Average energy price	• Average gas and electricity bills taken from SVDP (2023). • To get $/kWh or $/GJ charge, an average fixed annual charge was deducted based on a review of fixed charges from Tasmanian energy retailers. • Avoided fixed gas charges from fully electrifying are not counted. • Flat-rate electricity tariffs were assumed. The majority of Tasmanians are on flat-rate tariffs, though there is a trend towards time-of-use tariffs that could increase savings if new appliances are used at off-peak times.
Lifetime running cost	• Product of lifetime energy consumption and average energy price.
Total lifetime cost	• Sum of upfront cost per appliance and lifetime running cost.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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