Electrifying Australian Homes: Cut household energy bills, slash emissions and rebuild Australian manufacturing.

A national plan to electrify and improve Australia's residential buildings could deliver more than a third of Australia's legislated 43% emission reduction by 2030.

Electrifying Australian homes would save $9.4b in gas bills[1] per annum using proven and commercially available technology today, and ease industry gas availability.

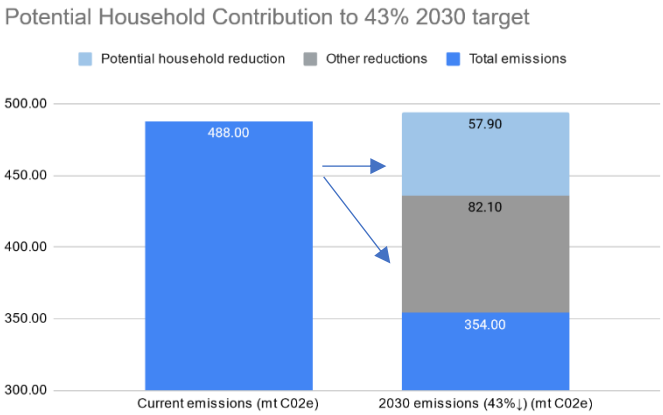
Upgrading the estimated 12.7 million gas appliances[2] in households across the nation could provide the basis for establishing a world class appliance manufacturing sector in Australia that can meet domestic demand and export to the world.

Go Early, Go Hard, Go Households

Achieving Australia's legislated target to reduce emissions by 43% by 2030 will require the rapid deployment of proven technology as fast as possible during the next eight years. The residential household sector should be a key contributor to achieving this target.

In 2008, Labor followed the advice to "Go early, go hard, go households" during the Global Financial Crisis and saved the economy from collapse. Today, we need to follow that advice again to drive down emissions fast and ease the cost-of-living increases hurting households.

Australian homes are responsible for 11% of national emissions through electricity and gas consumption, but can deliver significant early emissions savings with a nationwide rollout of proven and cost-effective technology solutions like split system air conditioners, heat pump hot water systems and induction cooktops as well as a continued installation of solar, insulation and battery storage.



Source: Greenhouse Gas Emissions Quarterly Update, DISR

Australia's proven track record in delivering successful nationwide housing programs, including a world leading rate of residential solar deployment, combined with the significant financial benefits to regular Australians from upgrades makes households a logical priority sector.

A program to rapidly electrify households and completely phase out residential gas use as well as lifting the number of solar homes from the current rate of 30% to as high as possible[3], especially rental properties, can quickly cut emissions and household bills.

A program that delivers a rapid reduction in residential gas use will also provide industry with a longer 'runway' to undertake the more capital intensive and complex electrification projects needed to transition industry away from gas consumption.

[1] Energy Account Australia, 2019-2020, ABS
[2] 2021 Residential Baseline Study, DISER
[3] https://www.energy.gov.au/households/solar-pv-and-batteries

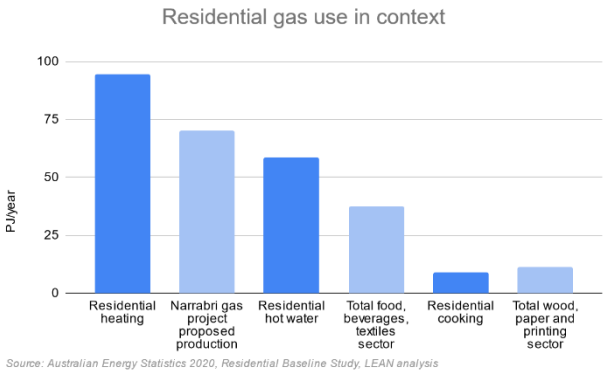
Electrifying Households

There are no technological barriers to decarbonising households unlike other sectors of the economy.

Full electrification includes the deployment of set of seven technologies: solar[4], home batteries, electric vehicles, smart home energy management systems, induction electric cooking, heat pump hot water heating and heat pump space heating (reverse cycle air-conditioning) as well as improving residential building performance with insulation and draft sealing.

Getting households off gas however is an urgent priority given the increased cost of gas and the consequences for household bills. Electrifying households will not only reduce household costs, but, if done well, will create significant numbers of new jobs in manufacturing, trades, finance and associated services.

Australian households spend $9.4b on gas bills annually[5], a figure that will likely rise as wholesale prices increases are passed through to consumers this year. Gas is used for three purposes in households, heating the air, heating water and cooking. Proven, price competitive and commercially available electric solutions can replace each of these uses and save households money.



A national program to phase out residential gas appliances and replace them with modern and safe electric technology would significantly reduce gas use and ease cost of living pressures on households.

The potential impact is significant, for example, electrifying residential space heating alone would save 94.6PJ of gas annually - that's 2.5 times the amount of gas used by Australia's entire food, beverages, and textiles sector (37.6 PJ pa).

Likewise, electrifying all residential hot water heating and cooking would free up 65.2 PJ of gas annually – equivalent to the 70 PJ that the proposed Narrabri gas project could theoretically deliver. However, electrifying households will save households billions in gas bills each year while also enabling the 'mining' of the gas network for the same volume of gas.

Concurrently, establishing minimum performance standards for existing residential properties at the point of sale or lease, in collaboration with state governments, will drive significant improvements in household energy efficiency including rental properties and further reduce cost of living pressures.

There are different pathways to the task of decarbonising Australia's households and both energy efficiency through building upgrades and fuel switching matter and need to be incentivised. Irrespective of the pathway though, government programs need to focus on three key barriers to deeper electrification of Australia's households including:

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[4] Not all households will have the option of installing household solar, due to living in strata or issues with overshadowing, but it is estimated that 70% of households could install solar.

[5] Energy Account Australia, 2019-2020, ABS

1. Communication to consumers – convincing households of the value of electrification, getting the right information about how to do it and the best equipment for their bespoke dwelling and ensuring their experience is well managed and communicated.
2. Unlocking electrification of rental properties - getting the split incentives right for the 30% of houses that are rentals
3. Supplying enough tradespeople to convert homes at the speed needed to meet Australia' emission reduction commitments.

Local Government: A trusted delivery partner

Delivering a successful nationwide housing electrification program will require delivery partners that are trusted by the community and that can ensure installations are safe and of high quality.

The local government sector could be an ideal partner in undertaking this work in partnership with the Federal Government. Local governments are deeply connected and highly trusted by their communities, as well as being highly experienced in procuring and delivering household services.

Partnering with the local government sector would ensure that regionally appropriate technology is procured and deployed and that minimum quality standards are adhered to so that low quality 'fly by night' installers are unable to take advantage of a national upgrade program.

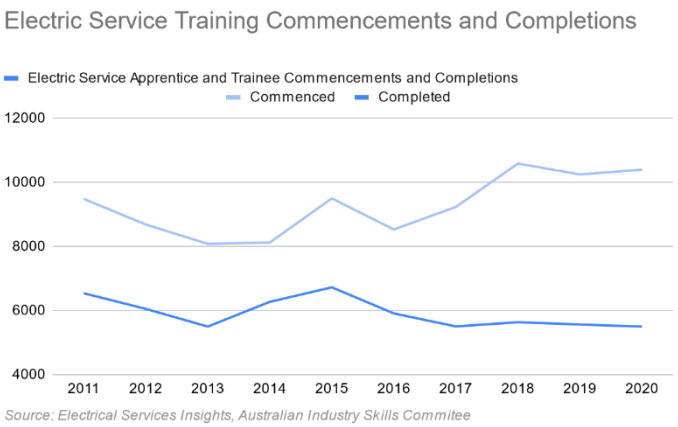
The municipal rates systems management by local governments could also provide a financial mechanism, appropriately supported by the Federal Government, that would remove the upfront cost barrier of electrification upgrades and solar installation, and enable multiyear repayments that are tied to the property that benefits from the upgrade rather than an individual person.

Government involvement in industry planning and coordination could help build and support the delivery models and quality control. Proper planning for industry development and roll-out will allow apprentices to be employed and for supply chains to be developed that deliver broader social and economic benefits. Careful procurement settings will allow companies to invest in secure jobs with good conditions. Australia has a long history of building competitive business models that rely on a race to the bottom. This needs to be avoided.

A Repowering of Australia Workforce Plan

A shortage of trained workers is currently one of the key barriers to achieving a national housing electrification program. A comprehensive industry and skills plan is needed to underpin decarbonisation of our energy system, including household electrification.

A priority will be to improve the completion rates of trainees and apprentices in electrical services. The latest figures from the Australian Industry and Skills Committee shows only half of electrical service trainees apprentices complete their training.



A workforce training and management plan is needed to ensure Australia has the tens of thousands of trained electricians, plumbers, smart energy managers and air-conditioning tradespeople required to electrify the nation.

For the most part, full electrification of Australian dwellings will mean retrofitting the existing housing stock. To scale up the skilled workforce of electricians, plumbers, air-conditioning installers required is an enormous challenge and opportunity.

Converting the average Australian dwelling to fully electric, zero emissions and cashflow positive requires at least the equivalent of four days of work by four different trades people.

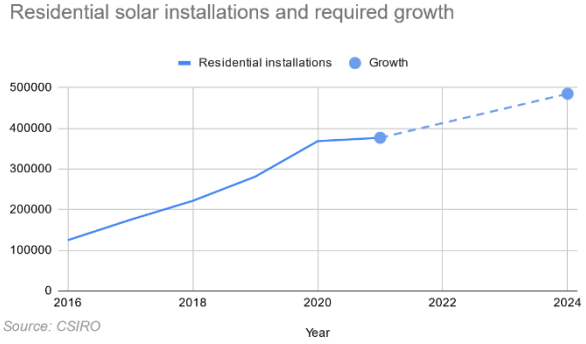
A Repowering Australia Industry and Skills plan needs to be developed that identifies trades requirements across the transition to a low carbon energy system, trains and supports apprentices and delivers opportunity for women, Indigenous and CALD workers. And addresses how to allocate workers across the various major tasks associated with the switch to renewable energy.

While the labour market is tight, we still have alarming rates of youth unemployment across the country. We need to support our young people into the necessary trades. Mentoring and support needs to accompany mandatory obligations for training apprentices.

Learning from solar; nationally consistent and robust certification and training programs are critical when it comes to the installation and maintenance of HVAC, batteries, EVs and smart switchboards.

This is best coordinated by the Federal Government to ensure consistent standards and high-quality training across the country. Training must be accessible to existing tradespeople for upskilling and include opportunities for continuous learning to adapt to skills development to meet the needs of electrified homes as technology develops, including accreditation for continuous learning. With the right incentives and support, electrification will create thousands of well paid, skilled jobs that cannot be offshored.

To provide some sense of the scale of the task, Australia installed more than 362,000 solar systems [6]on homes in 2020, however this needs to be increased to 485,000 by 2024 and then increased year on year to 2030 to deliver the emissions reduction Australia needs. It is estimated we need about 15,000 additional solar installers between now and 2030[7].



[6] CSIRO, https://www.csiro.au/en/news/news-releases/2021/australia-installs-record-breaking-number-of-rooftop-solar-panels

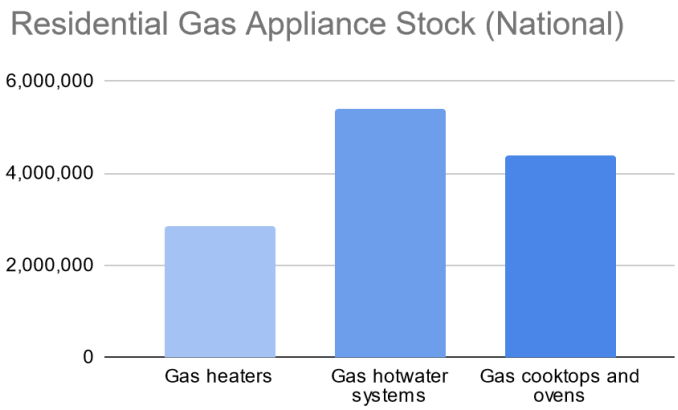
[7] Rewiring Australia

Similarly, Australia installs about 600,000 water heaters every year, even if those were all efficient electric appliances, Australia would need to increase the rate of installations every year to 2030. Air conditioners are still not in every home, meaning the industry will also need to ramp up, to supply the demand to replace gas heating, retrofit ageing air conditioners and install new systems (especially in heat-prone climates like Western Sydney).

Establishing a World Class Appliance Manufacturing Sector.

Household electrification is an opportunity for Australia to retool the local manufacturing industry and meet growing domestic and global demand for electrified appliances.

A national household electrification program will result in 12.7 million existing gas appliances replaced with modern electrified solutions. The household appliance manufacturing sector is currently a $2b industry than employs more than 3700 workers, however it has been shrinking by 3.4% per annum since 2017[8]. A core challenge is that much of the industry has specialised in gas appliances like hot water systems and heaters and will need targeted assistance to retool for high efficiency, electrified appliance production lines.



Source: 2021 Residential Baseline Study, DISER

The opportunity is far bigger than Australia though, globally a household electrification demand is rapidly growing, especially for heat pumps, and is starting to outpace supply as Europe in particular seeks to urgently reduce gas usage.

Australia can use existing policy commitments, like the National Reconstruction Fund, to undertake much needed capital investment in the manufacturing sector, support the national electrification program and create new export markets.

The Commonwealth Greenhouse and Energy Minimum Standards (GEMS) program is another highly effective mechanism that can be used to drive household electrification. The program's Minimum Energy Performance Standards (MEPS) has one of the best returns-on-investment of any action that could be taken to reduce household bills and has been instrumental in driving improvements in household energy efficiency.

Fast tracking increased minimum energy performance standards for high energy use appliances, such as hot water systems and heaters is a priority and will naturally favour electrification due to the superior energy efficiency of heat pumps and induction cooktops compared to gas.

Protecting existing manufacturers

Lifting standards without target industry upgrade programs can lead to the closure of local manufacturers. The closure of the Electrolux fridge factory in Orange in 2013 cost 544 jobs and was a direct result to higher energy efficiency standards without commensurate industry upgrade support. The cost of retooling was more than the cost of moving offshore. Other advanced economies

[8]Household Appliance Manufacturing Sector, IBISWorld, https://www.ibisworld.com/au/market-size/household-appliance-manufacturing/

support their manufacturers through these regulatory changes in order to maintain manufacturing jobs and Australia must do the same.

Government could share the cost of upgrading to enable Australian manufacturers to stay in the game, in a low emissions future.

An estimated $1.2-1.8 billion investment[9] to retool Australian manufacturers to manufacture smarter and more efficient appliances will deliver over $36 billion in net economic value through energy cost reductions and retain $60 billion in Australian manufacturing value and secure over 313,000 jobs, that may otherwise move overseas. This could be done for a cost as low as $5-7/$tCO_2$-e in avoided emissions, significantly cheaper than current ACCUs, at around $28 per tonne.

Establishing an Australia-Based Low-Emissions Manufacturing (ABLE-M) Program as part of the National Reconstruction Fund, could support the expansion of manufacturing related to households including the development of Australian heat pump hot water technologies, the local manufacturing of quality overseas brands of heat pump hot water and Australian lithium processing.

Australian industry policy should encourage and support onshore production and development of heat pump hot water and the related skilled employment as we re-establish the capacity for elaborately transformed manufactures (ETMs) in Australia. Direct government investment in Australian manufacturing of electrification technologies has the potential to drive innovation and skilled job creation, while continuing Australia's tradition of being a world leader in clean energy.

Conclusion

Household electrification provides a huge opportunity for Australia and is essential if we are to meet our legislated target of 43% emission reductions by 2030. The faster we move, the more of a head start we will have on leading the world and capitalising on the benefits. If we get this right, we can make Australia as a global household electrification leader and save households billions in annual energy bills and put them in the centre of generating renewable energy, managing demand and the grid.

We also have the opportunity to create thousands of high skilled high paid jobs and establish a thriving appliance manufacturing sector.

To maximise the positives in terms of emissions, cost of living and industry development we should be aiming to electrify most Australian homes by 2030, which makes for an average of about 1 million per year.

LEAN thanks the following organisations for their engagement and input: Electrical Trades Union, Smart Energy Council, Deposit Energy and Per Capita. The process of collaboration and discussion has been invaluable.

[9] Case to support Australian manufacturers transition in a low emissions economy, Deposit Energy