REWIRING GREATER BRISBANE

A REPORT ON THE COMMUNITY BENEFITS OF ELECTRIFICATION
PREPARED BY REWIRING AUSTRALIA



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OVERVIEW OF ELECTRIFICATION AND ITS BENEFITS

The planet is heating. Fires and floods are hitting our communities. Beautiful natural places such as the Great Barrier Reef are at risk. This is a plan that would decarbonise Greater Brisbane as urgently as the science demands and deliver huge savings for households.

Rewiring Australia's plan addresses climate change and cost-of-living at the same time.

Our research shows that Australia can lead the world by electrifying our homes and vehicles and powering them with renewable energy.

Modelling by Rewiring Australia demonstrates full electrification of households across Greater Brisbane[2] by 2030 would see:

The average household in Greater Brisbane save **$4,700** per year in energy bills and vehicle costs.

$3.9bn overall savings to Greater Brisbane, across all households.

Economic flow on effects across the region that could spark the indirect creation of up to **24,100** new jobs

All candidates in the 2022 federal election can support this plan. It will help Australians save money on energy and fuel and eliminate emissions. In this report we show that when entire communities and cities upgrade and electrify, the benefits will be amplified and shared. Less money will be sent out of the community and offshore from Australia. Billions of dollars can be retained in local communities and thousands of additional local jobs generated.

Full electrification of Brisbane households would reduce the region's emissions by 42.4%[1]. The technologies are almost entirely off-the-shelf, available today.

In addition to the cost savings across Greater Brisbane, electrification by 2030 will also see increased investment in local jobs:

$200m will be spent each year on the upgrading of Australian homes, installing zero emission appliances, solar and electric vehicle chargers.

This will equate to an additional **750** new local jobs

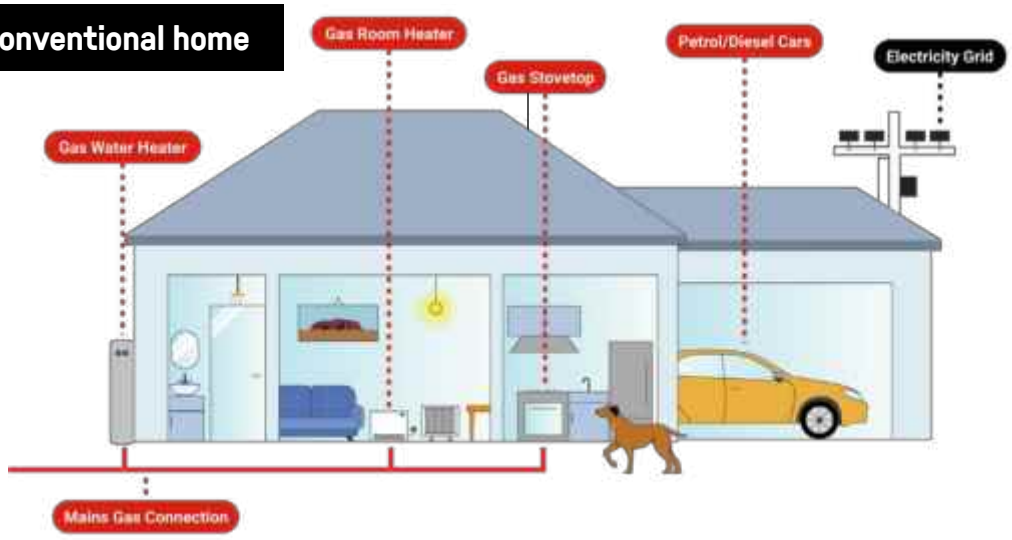
1. *Based on current average Australian domestic emissions, Rewiring Australia castles and cars study, October 2021.*
2. *For the purposes of this report, Greater Brisbane has been defined as households within the Federal Electorates of Longman, Dickson, Petrie, Lilley, Ryan, Brisbane, Griffith, Bonner, Moreton, Oxley, Rankin, Bowman and Forde.*

HOW HOME ELECTRIFICATION WORKS

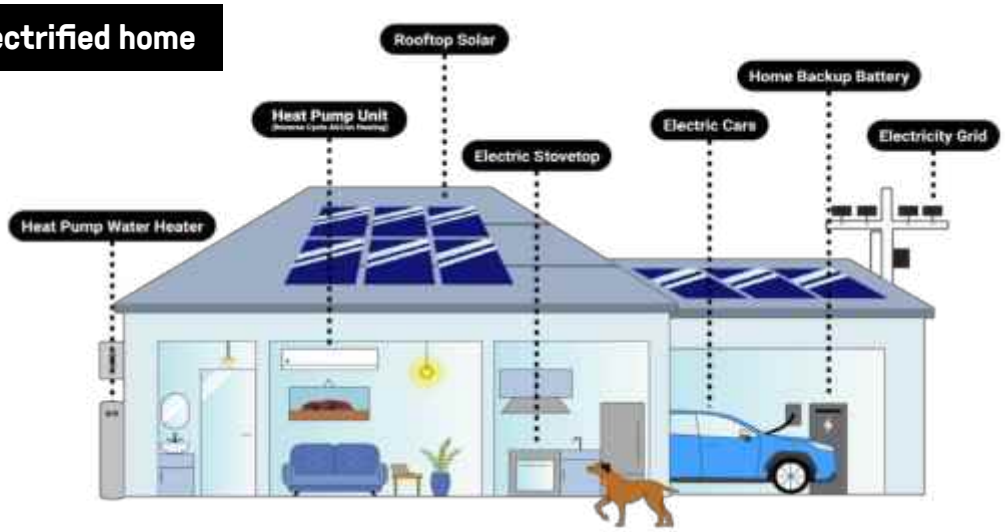
The technology to decarbonise and electrify households exists today. The more that consumers buy electric vehicles, solar, batteries and electric appliances, the cheaper and better they get. Electrifying a home and vehicle will save the average household around $5,000 a year in the long run.

The images below show what electrification looks like for the average household. The first step is to install solar (or supersize the existing system). It is vital to have a smart inverter and upgrade the switchboard to manage how the house exports and imports to the grid. The biggest purchase financially is to replace petrol/diesel cars with electric vehicles and use the batteries as part of the household energy system. Gas room heaters are replaced with heat pump units (reverse cycle or 'split system') air conditioning which provides heating and cooling. The gas water heater is replaced with a heat pump water heater and electric induction stovetops replace the gas stovetop. Then the gas supply is turned off, saving hundreds of dollars in connection fees!

Conventional home



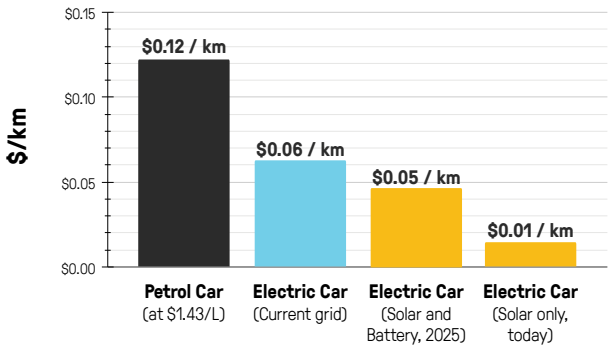
Electrified home

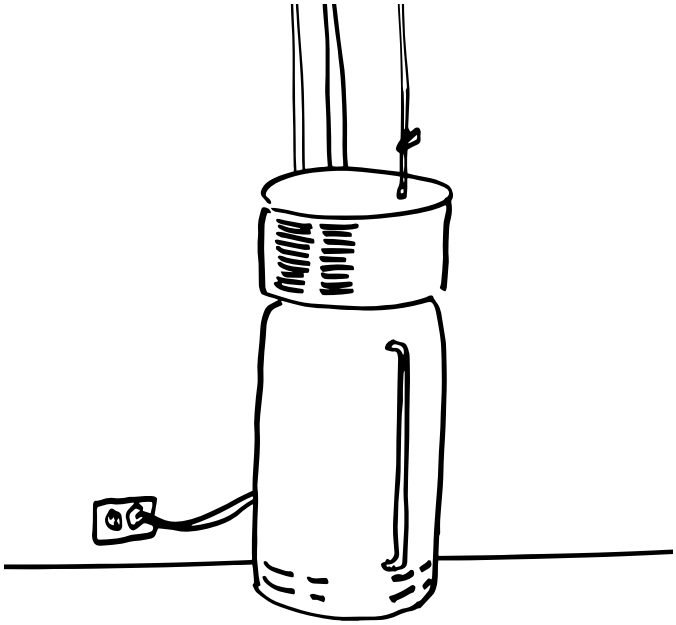


HOW ELECTRIFICATION SAVES MONEY

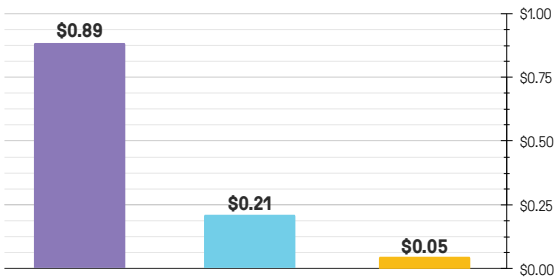
An electric car costs about 6 cents per km to drive if charged from the grid, compared to a petrol car which costs about 12 cents per km (when petrol is at $1.43/L). Charging an electric car with rooftop solar reduces this even further, to about 1 cent a km, over 10 times less than a petrol car.

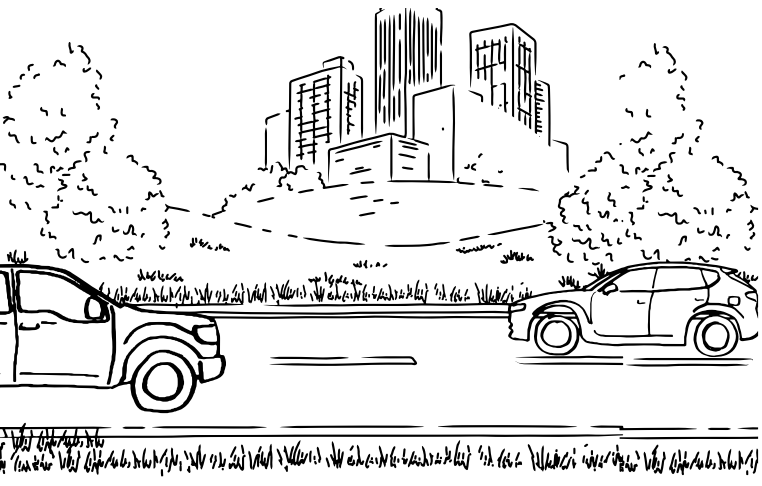
QLD driving cost per km - petrol car versus electric car - mid-size





QLD water heating cost for one luxurious shower

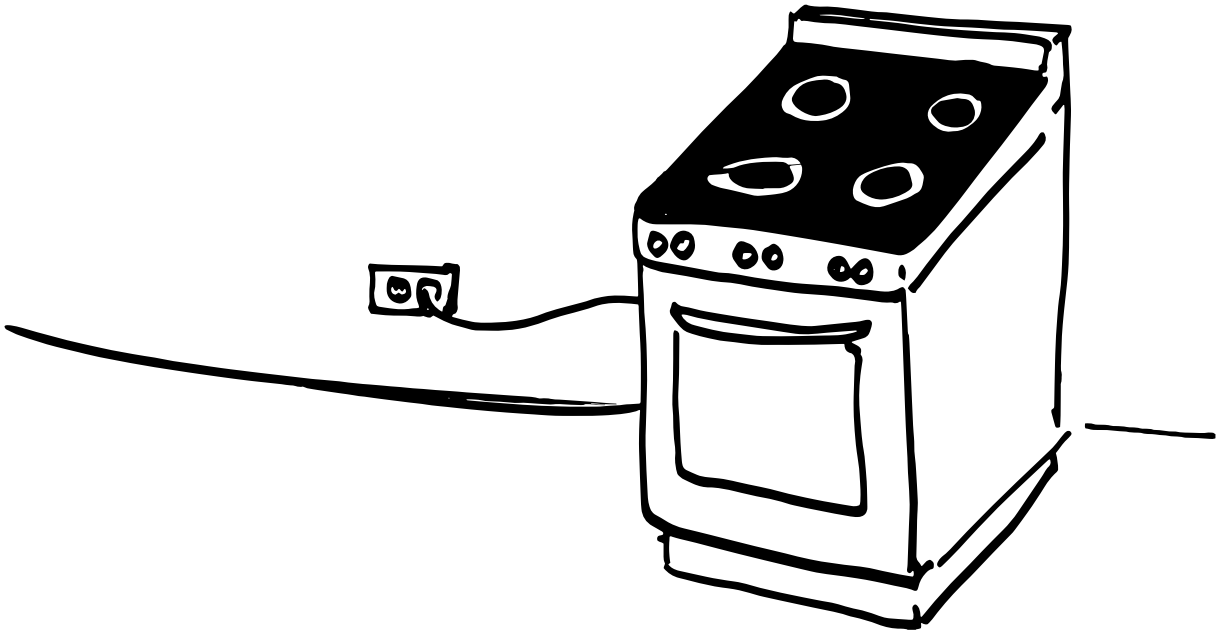




Heating the water for a shower with a gas water heater costs about 89 cents with standard gas prices (2019). An electric heat pump water heater costs just 21 cents to provide the same hot shower using grid electricity. Using rooftop solar, that shower is costs just 5 cents, over 10 times less than a gas shower.

Heat pumps for room heating provide the same cost benefits compared with gas heaters. An electric induction stovetop is cheaper than a gas stove and also provides health benefits inside the home, as the invisible pollutants from gas stoves cause significant negative health impacts.

BALANCING OUT THE UPFRONT CAPITAL COSTS OF ELECTRIFICATION



Electrifying households is a capital investment in the future, like buying a mortgage or an education. In the past governments and big energy companies borrowed billions on our behalf to build coal and gas power stations and build the grid. We paid these assets off over time, including the cost of the debt used to build this infrastructure.

Household electrification involves a similar investment but in millions of small machines, not a dozen big ones. Rewiring Australia models the economics of electrification on the basis that, like other nation-building infrastructure, nobody will have to pay up-front to rewire their house.

The savings modelled for electrification take into account the upfront costs of purchase and assume that they are financed over the lifetime of the asset. In a few years, commercial lenders will be able to finance electrification for most households. In the early years of the transition, governments will have to step in and provide co-finance like they already do for large-scale clean energy. Government support is essential in helping all homes, including low-income households electrify and save money on the cost of heating, cooling, cooking and driving. We revisit our economic plans for electrification on page 6 where we set out policy asks for this election.



ELECTRIFICATION AT THE COMMUNITY LEVEL

The benefits are amplified when entire suburbs, communities and regions electrify their homes. Changing the way energy is created and used will reinvigorate local communities and economies by keeping savings in local areas and injecting millions of dollars into well-paid, skilled jobs.

Generating more electricity at the community level

The communities of tomorrow will stay connected to the grid, while generating far more energy locally using the cheapest home energy in the world - Australian rooftop solar. Staying on the grid will continue to balance community electricity needs, while producing most of our energy from community rooftop solar. This will mean the lowest possible energy prices for households.

Money in the community

The bulk of current household fossil fuel spending is on petrol and diesel products imported from overseas. This is money that is not being reinvested into Australian jobs, businesses or community infrastructure. Electrification of our homes will keep this money in the local community, both in it's new clean infrastructure, and in the economic savings made by homes.

Graphic of two houses. Money spent on fossil fuels that leaves the community. And money spent that circles back into the community. Provide figures for Greater Brisbane.

Investing in local jobs

The electrification of homes will save money for communities, and also require the upgrading and renovation of thousands of homes, generating local jobs. This will generate local jobs for the installation of solar panels, batteries, electric vehicle chargers, heating systems, and cooktops. These are skilled, local jobs that can't be taken offshore.

Zero-emissions communities

Australia has the climate, technology and solar track record to create the world's first zero-emissions communities. Modelling demonstrates this is achievable and will see broad benefits for communities. The Rewiring Australia study Castles and Cars modelled the energy and economic impacts of home electrification for the average individual household. We have built on this model to quantify the economic and jobs benefits that electrification will have for communities and regions.



If all of the **64,829** households in the **Federal Electorate of Longman** were to electrify their homes we could see:

$304m

HOUSEHOLD SAVINGS

Household savings in energy bills and vehicle costs across the electorate

$16m

INVESTMENT IN LOCAL JOBS

Money invested in local installation and maintenance jobs

1,900

NEW JOBS FROM LOCAL SAVINGS AND INSTALLATIONS

Direct and indirect jobs generated from installations and economic savings in the region.

If all of the **78,098** households in the **Federal Electorate of Brisbane** were to electrify their homes we could see:

$285m

HOUSEHOLD SAVINGS

$18.3m

INVESTMENT IN LOCAL JOBS

1,800

NEW JOBS FROM LOCAL SAVINGS AND INSTALLATIONS

If all of the **71,136** households in the **Federal Electorate of Griffith** were to electrify their homes we could see:

$297m

HOUSEHOLD SAVINGS

$17.1m

INVESTMENT IN LOCAL JOBS

1,800

NEW JOBS FROM LOCAL SAVINGS AND INSTALLATIONS

HOW DO WE GET THERE?

Now is the time for investment in electrification. The 2022 Federal Election provides an important opportunity for political parties and candidates to commit to the switch from fossil fuels to renewable energy. Rewiring Australia believes this must happen at the household and needs support and funding from the Federal Government. Four policies will make Australia a world leader in the electrification revolution:

1 | 2022 - 2025: Pilots to showcase the technology

Australia is the place to make electrification happen first. We have the institutions, technology and successful love affair with rooftop solar. But with any change, we need to show people how it works and iron out any issues before we move towards the mass electrification of the country. Four world-first pilots that electrify entire communities will provide an opportunity to demonstrate how the technologies fit together to deliver cheaper energy and transport for households while not creating any issues for grid security. The pilots would work with 300-500 households in two urban and two rural communities. Households in these communities would receive support in the process of electrification and subsidies for new electric appliances, solar, battery, energy control system and lease of an electric vehicle. The pilots would cost up to $100 million and could be delivered by the Australian Renewable Energy Agency within its existing budget.

2 | 2022 - 2030: Subsidies to bring down costs and scale up the industry

The cost of electrifying homes is dropping and will continue to as the renewable industries grow. But the scale of mass electrification means we need to accelerate cost reductions and scale up Australia's electrification industry. The Federal Government must invest in early commercial deployment of the products and technology needed to electrify homes. Over the 2020s $12 billion of federal government funding is all that is needed to turbocharge all 11 million Australian households to make the switch to solar energy and storage for homes and vehicles, regardless of their postcode or financial constraints. By around 2026 electrification will be commercially driven and not require subsidies for most homes. While $12 billion sounds like a lot, it equates to less than 10% of Covid stimulus spending and far less than current fossil fuel subsidies. Almost half of this money could be captured by uncommitted funds from the Clean Energy Finance Corporation.

3 | Training to build the workforce

An electrified economy will be jobs-rich with new jobs generated to upgrade and maintain electrified homes. A massive training and accreditation effort will be needed to upskill and build the workforce to meet demand. Funding for this work will be supported by the subsidies outlined above. This effort will also need to draw together unions, employers and the trade education sector.

4 | Deregulation to-cut the brown tape holding back solar, storage and EVs

There are hundreds of out-dated laws and regulations holding back electrification. These range from the thousands of pages of electricity law to planning schemes that do not make it easy for communities and companies to install private and shared EV chargers. Over the next two years, Australia must cut through the brown tape so, the market can flourish and households can profit.

ABOUT REWIRING AUSTRALIA

Rewiring Australia was launched in 2021, founded by Dr. Saul Griffith. It is supported by an optimistic group of non-partisan Australians to collectively illustrate the positive climate and economic outcomes possible for Australia, and the world, with the electrification of fossil fuel machines.

In October 2021,we released our inaugural report Castles & Cars - Savings in the suburbs through electrifying everything. The report found that a $12 billion investment over 5 years in Australian homes and vehicles would reap $300 billion in household savings by 2035.

In 2022 we are continuing to build public support and work with communities and policy makers. Saul has hit the road in an electric vehicle on a roadshow to promote his new book, The Big Switch. We've had some great conversations with towns and suburbs committed to joining the electric future today. And we're hoping to continue working with them to help them realise their ambition.

Our task is to continue engaging with with business, industry, unions, investors and other stakeholders to cut the 'green tape' make electrification a reality. As outlined in the Policy asks of this section, we have big plans to have a pilot program run to electrify an Australian town and suburb. This would be a world first demonstration of full electrification that brings to light the abundant future available if Australia invests in the decarbonisation of its household Infrastructure.

Rewiring Australia



ABOUT SAUL GRIFFITH

Saul is an Australian inventor and entrepreneur. He received his Ph.D. at MIT in the junction between materials science and information theory. Prior to MIT, Saul studied metallurgical engineering at UNSW in Sydney and at UC Berkeley in California. His first two industrial jobs were in a steel rolling mill in Newcastle and an aluminium smelter in Western Sydney.

Since graduating in 2004 Saul has founded and co-founded numerous technology companies based in the Bay Area. In 2007 Saul was awarded a Macarthur Fellowship, the so-called 'Genius Grant', for inventions in the service of humanity. Saul has been a project lead on federally funded research projects for agencies including Department of Energy, NASA and the United States Special Operations Command.

Saul has published two books. His first book published with MIT Press, Electrify, focused on a realistic and feasible plan for fighting climate change while creating jobs in America. His second book The Big Switch was published in 2022. It aims to make the climate conversation accessible and understandable for everyday Australians, and to demonstrate how much we have to win if we build Australia into a renewable decarbonised super power.

He is a father of two, and a consistent champion of STEAM education (including the A for ART!). Saul's hobbies include electrifying vintage cars and inventing increasingly dangerous new sports.

REFERENCES

METHODOLOGY NOTES

Modelling the household and community level savings

The household electrification model (including energy use, emissions, pricing) is based on the Rewiring Australia Castles and Cars Technical Study, October 2021 (https://www.rewiringaustralia.org/castles-and-cars). This model has been further refined with community level household numbers, vehicles per household in each community, and postcode level solar data.

Household numbers for communities are derived from the ABS 2016 Census of Population and Housing, using occupied private dwellings. To account for the increase in housing between 2016 and 2022, ABS Household and Family Projections, Australia 2016-204 are used. The projected percentage increase in homes from 2016 to 2022 Series II by state or closest city is multiplied by the 2016 Census households figure.

Vehicles per household are derived from the 2016 Census.

Rooftop solar capacity factors are derived from postcode level solar data between April 2021 and March 2022, provided by Solar Analytics. Where data is not available for a 4 digit postcode, the average for the larger 2 digit postcode is used. Electorate level capacity factors are derived from a weighted average of the postcode level solar data in the electorate, weighted by the households in each postcode. The number of households to use for the weighted average is weighted by the proportion of the postal area within the electorate as prescribed in the Parliament of Australia's Postal Area to Commonwealth Electoral Divisions guide using that latest available update (updated 28 April 2021) at the time of modelling.

Modelling community spending and job creation

The savings made by households in the community are likely to result in new household spending.

Employment to GDP ratios were used to model job creations. Assuming labour is available and that there is no net poaching from other employers, for every million in new spending 5.9 jobs will be created. Calculations based on ABS 2021 Australian National Accounts: Input-Output Tables, 2018-19 and ABS 2022 Labour Force, Australia, March 2022. The annualised December quarter GDP figure was used as well as the employment figure for November 2021, the midpoint of the quarter.

Spending patterns were used to model indirect job creation. For every million dollars of sales in Australia, 39 per cent is final usage and 61 per cent is intermediate goods. This suggests that for every million dollars of direct value added there is another $1.56 million of indirect value added. Assuming similar labour intensities then every direct job created is associated with 1.56 indirect jobs giving a total of 2.56 jobs. Calculations based on ABS (2021) Australian National Accounts: Input-Output Tables, 2018-19.

Consumption spending was used to model how much of the household savings of electrification will remain in the region. The model makes a conservative estimate that 60 percent of spending remains in a local area. This calculation is based on *ABS Australian National Accounts: National income, expenditure and product, December 2021*.

In the four quarters of 2021, 55 per cent of Australian consumption spending is on services that are produced locally including rent and other dwelling services, health, operation of vehicles, transport services, recreation and culture, education services, hotels, cafes and restaurants. A further 8 per cent involves sales of goods likely to have very high retail and wholesale markups plus some local content. These include food, clothing and footwear, furnishings etc and 4 per cent local content would be reasonable. The remainder includes purchases of motor vehicles, communications, insurance and other financial services which are unlikely to have much local content. Hence all up we can assume a conservative 60 per cent of new spending remains in the local area. (calculations based on ABS (2022) *Australian National Accounts: National income, expenditure and product, December 2021, 2 March.)*

In summary, based on national averages, for every $million in spending 5.9 total jobs are created and, of those, 2.3 (39% of 5.9) are direct jobs and 3.6 indirect. 60% of all these jobs might be expected to remain in the local community.

Direct installation jobs were modelled using ABS (2021) Australian National Accounts: Input-Output Tables, 2018-19 based on "Residential Construction". For every $million in spending 1.5 direct jobs are created, and 2.2 jobs in other industries are created. In total, 3.7 jobs per $million for spending on electrification installations.


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