NZGBC
TE KAUNIHERA HANGANGA TAUTAIAO

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Protecting industry, jobs and household budgets as the gas runs out

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Foreword

The closure of three mills by Winstone Pulp International and Oji Fibre Solutions due to soaring electricity prices sent a sobering signal about the fragility of New Zealand's energy landscape. These closures aren't isolated events, they're symptoms of a deeper issue: the growing uncertainty around our energy supply. As gas reserves dwindle and electricity demand rises, the pressure on businesses, households, and our economy is intensifying.

While New Zealand grapples with addressing supply, this report offers a clear and compelling option to also reduce demand. By accelerating the adoption of heat pumps, we can unlock significant energy savings, reduce reliance on gas, and free up electricity for the industries and communities that need it most. This isn't just about technology, it's about ongoing resilience. It's about keeping businesses open, protecting jobs, improving public health, and lowering energy costs for families in New Zealand.

The opportunity before us is substantial. By shifting how we heat our homes and workplaces, we can redirect energy to where it's most valuable, providing valuable time for our industrial base to decarbonise, and build a more secure and affordable energy future. The recommendations in this report are practical and timely. They deserve serious consideration and swift action.

New Zealand has always been a country that rises to a challenge. With the right policies and a shared commitment to change, we can turn today's energy crisis into tomorrow's opportunity.

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Contents

We thank the following for the valuable input they provided on this work

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The reviews were provided in a personal capacity and do not confer endorsement from their employers.

NZGBC appreciates the collaboration with Victor Consulting in developing this report.

Auckland University, B201 Building
Photo credit: Mark Scowan

1

Executive summary and recommendations

New Zealand is rapidly running out of natural gas/LPG, contributing to what the Minister for Energy Simon Watts has called the country's "energy shortage". Inaction will see further rising and volatile energy prices for business and households, likely resulting in the additional crippling of major manufacturers, costing New Zealand export earnings, and the loss of many jobs. Bold government action can fix this energy shortage.

The Prime Minister of New Zealand has invited New Zealanders to come forward with solutions. This paper sets out practical steps to support our energy system. It shows how accelerating electrification of the property sector, simply through the adoption of heat pumps could be a simple, yet powerful lever for Government to address the energy crisis.

MBIE reports that, in 2023, natural gas and LPG contributed a combined 19% of New Zealand's total energy supply.[1] But production is dwindling. It fell from 155PJ (Petajoules) per annum in 2023 to 125PJ in 2024 and is falling further in 2025.[2] MBIE projects natural gas/LPG supply will fall to 70PJ by 2030 and just 36PJ by 2035, less than a quarter of 2023 production. Even optimistic projections of biogas and hydrogen production are only small fractions of this decline.

This will mean there will soon not be enough natural gas/LPG available for current industrial, commercial, electricity generation, and residential uses. Without policy actions to reduce demand in a purposeful fashion, market forces will lead to demand destruction through very high gas prices, which will push up costs for all users. This market failure puts pressure on the viability of businesses and the jobs they support, and risks contributing to higher living costs for households.

The exhaustion of natural gas/LPG reserves is set to coincide with a 15% increase in electricity demand over the coming decade, according to the Second Emissions Reduction Plan, due to electrification of transport and industry. Transpower has warned this threatens tighter electricity supply margins, as new renewable generation capacity and battery storage installations struggle to keep up with both new demand and the need to replace gas-fired generation.[3] This means increased risk of shortages in dry winters, and higher prices hitting both businesses and households.

High energy prices are putting many businesses in New Zealand under pressure. Some Zealand companies are going out of business. Industry leaders are pleading for action.[4]

Even before the oil and gas offshore exploration ban, no new commercial fields had been found since 2000, and exploration drilling had all but ceased by 2015. The known reserves have been revised down in recent years, with just 980PJ thought to be left.[5] Even if new discoveries are made, they are not expected to begin production until the 2030s and are unlikely to fully compensate for the natural decline in output from existing fields.

There are steps that can be taken to provide more certainty and keep industry and jobs in New Zealand.

EECA data shows that commercial and residential buildings consume 18PJ of natural gas/LPG for space heating and water heating.[6] Additionally, resistance heaters and resistance hot water cylinders in these buildings consume 7,400GWh (Gigawatt hours. 1PJ = 278GWh) of electricity a year. That is 15% of current natural gas/LPG supply and 19% of electricity supply.

Heat pumps and hot water heat pumps can replace these uses of natural gas/LPG and inefficient resistance heaters. Heat pumps are so energy efficient that the extra electricity demand from replacing gas space and water heating with heat pumps can be more than offset by also replacing electric resistance heaters and hot water cylinders with heat pumps.

This would save 18PJ of natural gas/LPG directly and also result in net electricity savings of up to 4,000GWh a year. In theory this could be enough to significantly reduce the need for gas-fired electricity production, which consumes 30PJ of natural gas/LPG a year, although it would require load and capacity shifting to fully realise this benefit.

Through both direct savings and reducing the use of natural gas/LPG to generate electricity, full adoption of heat pumps could save 18-48PJ of natural gas/LPG a year (14%-38% of current production), while also reducing the cost of living and business expenses. At current prices, the electricity and gas bill savings to households alone would be up to $1.5b a year.

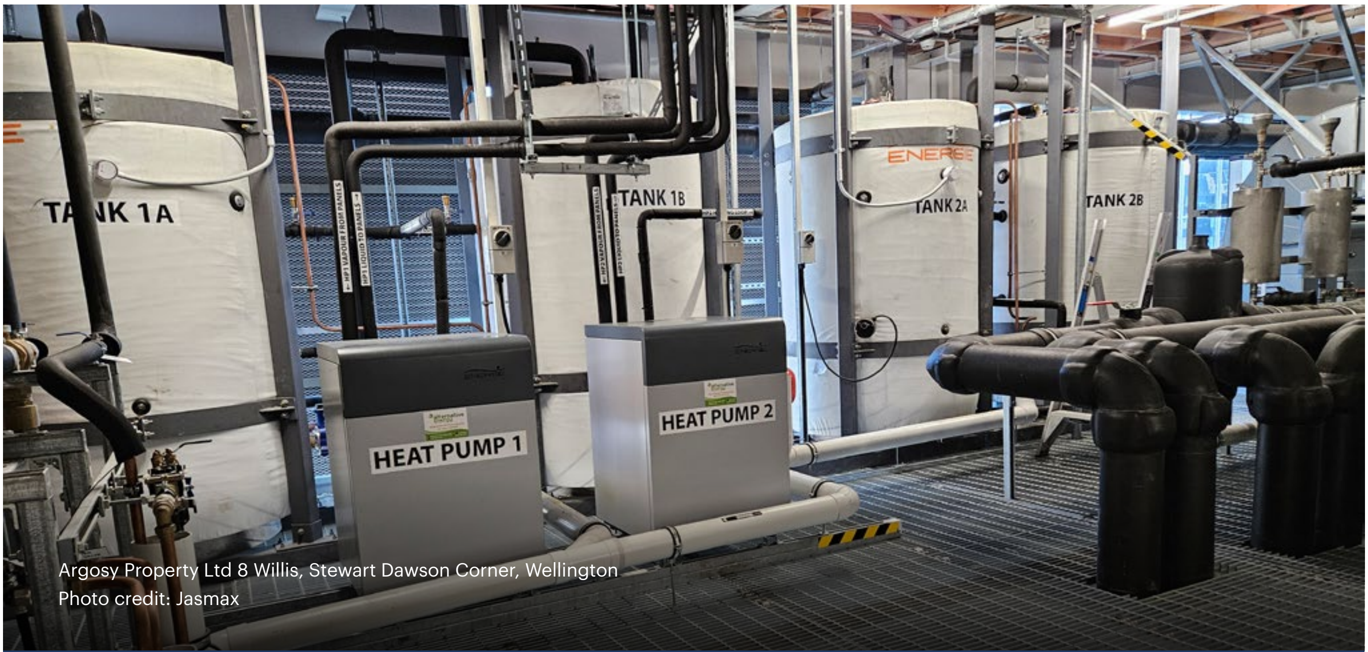
Implementing a heat pump conversion programme for commercial and residential space and water heating over the coming decade could reduce natural gas and LPG use by up to 240PJ by 2035 — around a quarter of the remaining reserves. This would help ensure that remaining supplies are available for high-value, harder-to-transition uses such as high-temperature industrial processes, supporting the ongoing operation of these industries providing them more time to work toward viable low-emissions alternatives. In turn, this approach can support economic stability and help maintain employment in key sectors and regions.

A heat pump adoption programme (in concert with other energy efficiency measures) would also reduce winter demand peaks significantly as space heating accounts for most of the increase in demand during these periods. Lessening the scale of winter heating demand would ease the risk of a repeat of the economically damaging natural gas/LPG and electricity prices seen in the winter of 2024, and of spikes during cold snaps exceeding available energy supply.

Other jurisdictions are also facing gas supply constraints and moving quickly to help households and other buildings move to heat pumps for water and space heating. In this context, continuing to connect new homes to the natural gas network and install gas appliances as we are doing in New Zealand does not seem sensible when the gas is running out.

The knock on effect of firms going out of business is a significant reduction in Government revenues. It is estimated that annual losses can mount to tens of millions from revenues usually collected through GST, income and other business taxes.

Other jurisdictions are also facing gas supply constraints and moving quickly to help households and other buildings move to heat pumps for water and space heating. In this context, continuing to connect new homes to the natural gas network and install gas appliances as we are doing in New Zealand does not seem sensible when the gas is running out.



Argosy Property Ltd 8 Willis, Stewart Dawson Corner, Wellington
Photo credit: Jasmax

Recommended actions

- Expand Warmer Kiwi Homes (WKH) to include a wider range of insulation products and a deep retrofit programme for the least energy efficient low income homes.
- Subsidise heat pumps and hot water heat pumps for homes and businesses, as Canada, the US, many European countries, and the Australian state of Victoria are doing. This can be done using the WKH programme and the proposed Ratepayer Assistance Scheme.
- To support these retrofits, encourage banks to extend their existing offerings for low-interest loans to cover heat pumps and hot water heat pump systems, and offer more attractive terms.
- Follow Victoria's lead and phase-out gas hot water systems by requiring them to be replaced with electric systems at end of their life.
- End the sale of portable and fixed gas space heaters.
- Improve energy efficiency requirements and availability of time of use control for electric heating systems.
- Require new buildings to be 'all-electric', with a moratorium on new gas connections, improving the Building Code to require new building use heat pumps for space and water heating.
- Review tax and depreciation rules for opportunities to speed up use of heat pumps for commercial buildings.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2

Energy shortage

New Zealand is facing an energy crisis. Effective policies are needed to reduce the imbalance between supply and demand, or else high prices will continue to hurt businesses and households, and the threat of shortages will loom over the economy.

Over the past two years, natural gas/LPG (in this paper, 'natural gas/LPG' statistics refer to natural gas plus liquified petroleum gas, unless separately stated) production has collapsed by a quarter. This has coincided with relatively dry weather reducing hydro lake reserves, leading to very high prices for both natural gas/LPG and electricity.

At $192MWh, the average spot price for electricity from July 2023 to June 2025 was almost twice the previous decade's average of $100MWh, with spikes to nearly $800MWh in 2024 and $400MWh in 2025.[7] Wholesale natural gas has cost $12/GJ on average since the start of 2024, with spikes to $50/GJ, compared to an average over the previous decade of $7/GJ.[8]

These high prices have seen major manufacturers decide to reduce output and, in some cases, cease production altogether. Examples include Penrose Mill, Karioi Pulp Mill and Tangiwai Sawmill.

Mānawa Bay Premium Outlet Centre, Auckland

Energy prices kill major Ruapehu employer

Winstone Pulp International has shut down entirely after 45 years in operation in October 2024, with the loss of 230 jobs in its two mills, due to unsustainable energy costs.

Winstone Pulp chief executive Mike Ryan said prices spiking to hundreds of dollars per megawatt hour had been fatal for the company.

The loss of the Ruapehu District's major employer reportedly forced some workers to move overseas for work. The loss of income will affect the local economy and also business partners of the mills, such as Port of Napier, with CEO Todd Dawson saying the loss of cargo would hit the Port's earnings and "We feel incredibly disappointed they are confronted with no option but to consider ceasing their operations due to current and ongoing challenges related to abnormally high energy costs."

Other New Zealand based businesses have also been similarly impacted. For example, Oji Fibre Solutions (OjiFS), a leading manufacturer of pulp, paper and wood-fibre based packaging solutions recently closed their paper line leading to around 1000 jobs cut across New Zealand.

In short, deindustrialisation has been the first answer that our energy markets have generated. An answer that means a smaller economy, reduced exports, fewer jobs, and lower incomes. This trend will continue without policy leadership that finds ways to ensure manufacturers have a supply of affordable energy.

Aluminium manufacturer under threat

Glucina Alloys in Auckland is New Zealand's only aluminum recycler, producing 200 tonnes of pure aluminium ingots from waste each month. This not only reduces waste to landfill but also saves energy as aluminium recycling is much more energy efficient than production of new aluminium, and keeps the aluminium recycling value chain in New Zealand.

Genesis Energy has advised Glucina Alloys that, when its existing gas contract ends in 2026, it will only be able to get short-term contract at much higher prices. The alternative is electrification, but the new connection alone will cost $800,000 and electricity prices are also rising.

"What we've got here is what some would call the slow de-industrialisation of New Zealand" says Auckland Chamber of Commerce CEO Simon Bridges.

"Where's the leadership from Government that gives us security of supply?" asks manager Steven Welburn in a recent BusinessDesk article.[9]

High spot prices for natural gas and electricity have taken time to flow through to households. But that is now occurring. Residential electricity rose an average of 8.4% in the year to June 2025, while the average residential natural gas price was up 15.7% - far exceeding household income growth.[10]

One way to address the shortage of affordable energy is increased supply. However, there will be no reversal in the decline in natural gas/LPG production in the foreseeable future and electricity will struggle to keep up with both new demand and the coming crunch on gas generation.

Natural gas/LPG production is in terminal decline and new exploration is no quick fix

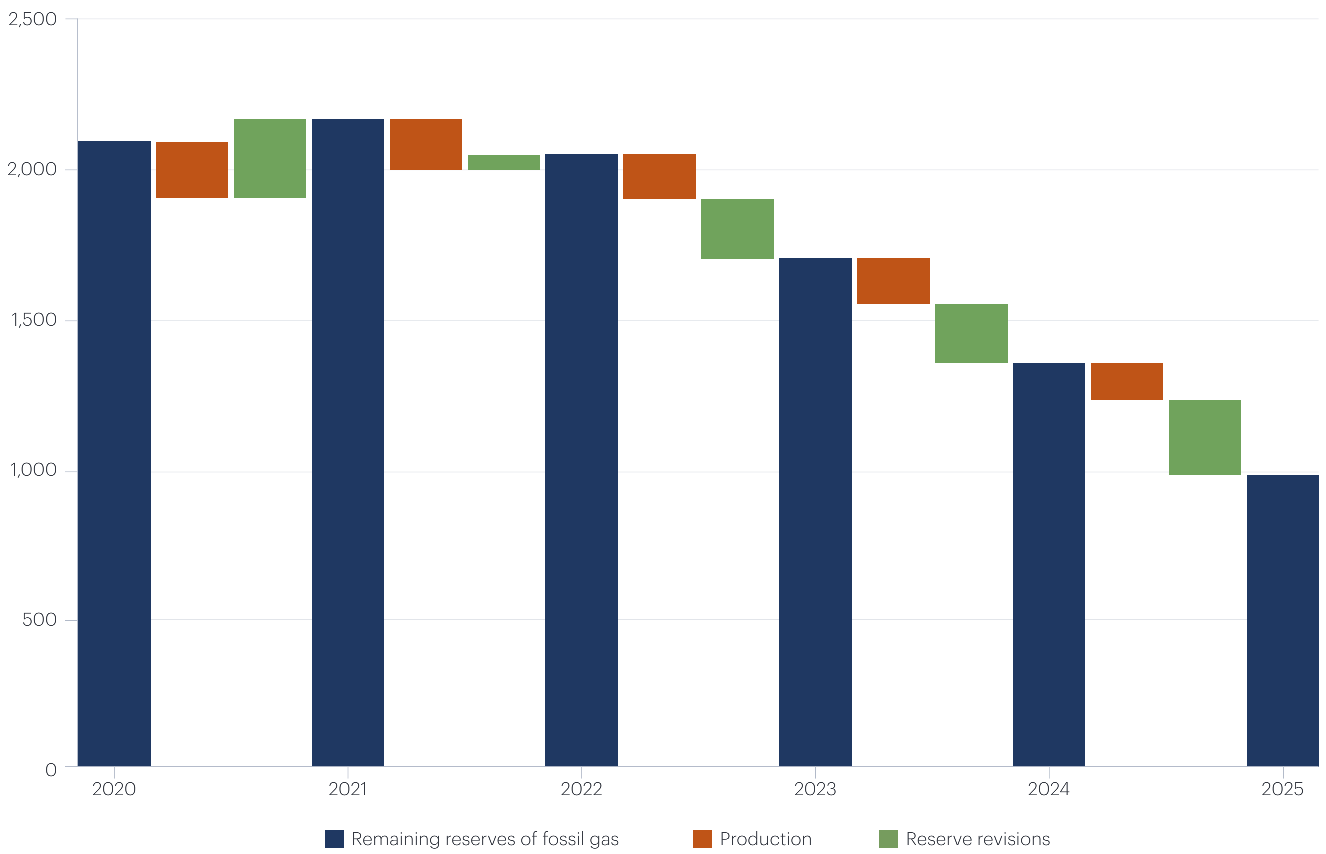
Natural gas/LPG production has been winding down since 2001. No significant new commercial fields have come online since Kupe in 2009 and reserves in known fields have been slowly depleting.

This process has suddenly turbo-charged in recent years as analysis has shown known reserves hold less gas than previously thought. The last three years have seen known (P2) reserves of natural gas/LPG fall from over 2,000PJ to less than 1,000PJ. This decrease is primarily due to downward revisions of known fields' remaining reserves, as wells that were expected to produce gas have come up dry, rather than production.

Compounding this, output from existing wells, particularly offshore, have declined at a faster rate than expected. The last remaining reserves from a gas field are harder to extract, resulting in lower production of natural gas/LPG. Production has declined from 155 PJ in 2023 to 119PJ in the past 12 months.[11] MBIE projects the decline will continue, with production of 99PJ in 2027, 70PJ in 2030 and only 36PJ in 2035.[12]

The Second Emissions Reduction Plan forecasts that demand for natural gas/LPG will reduce much more slowly than available supply.

Remaining fossil gas reserves (P2), PJ



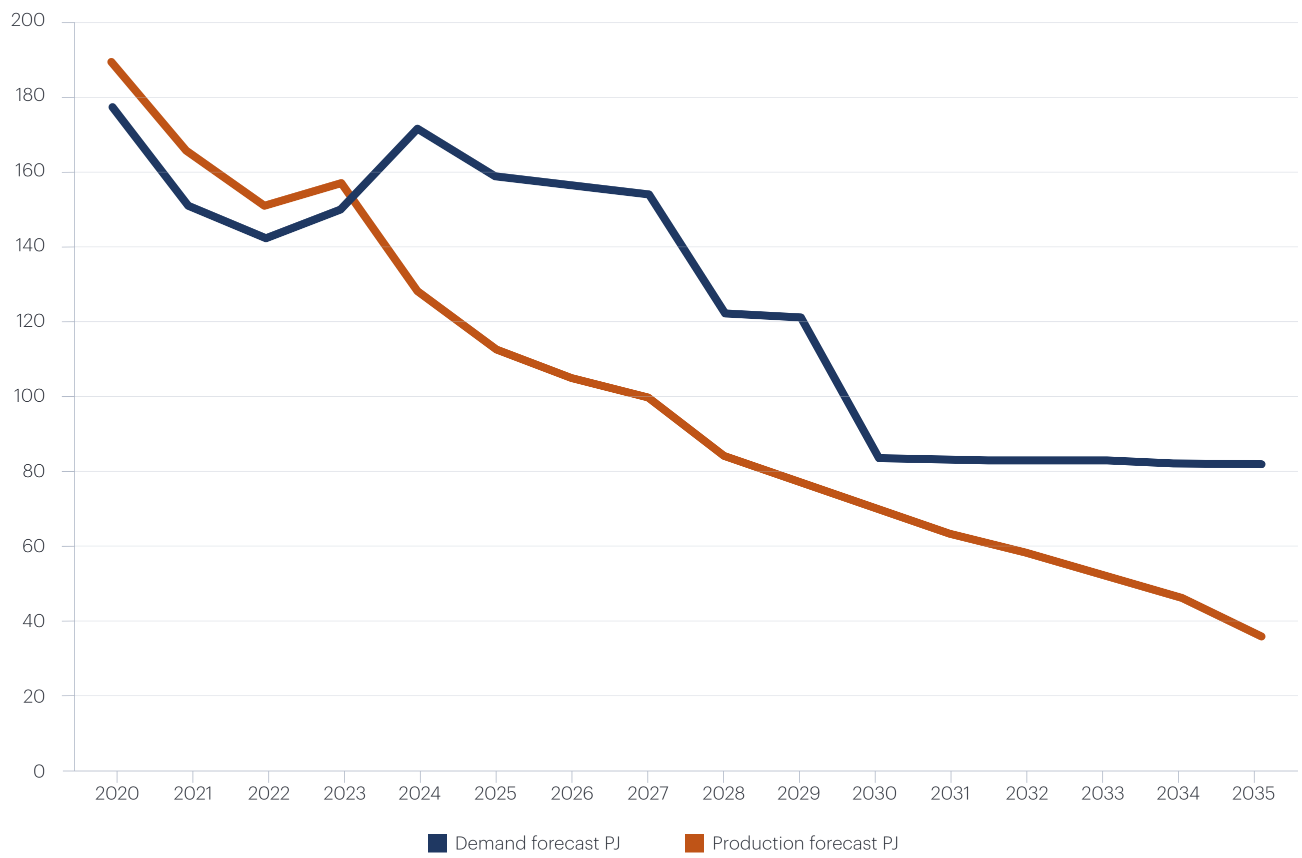
Source: EECA, Petroleum Reserves and Gas Statistics

There will not be enough natural gas/LPG to go around. MBIE's Energy Balance statistics[13] show that, in 2023:

- 'Non-energy uses' (eg Methanex converting natural gas to methanol) used 39PJ
- Electricity production consumed 33PJ, with co-generation a further 10PJ
- Process heat for chemical production consumed 24PJ
- Food processing used a further 20PJ
- Homes used 11PJ
- Commercial uses (eg office heating) consumed 10PJ
- Other industrial sectors used the remainder

Even with forecast demand reduction, by 2035, production will only be sufficient to meet projected industrial demand if electricity generation, commercial, and residential demand are severely reduced, or factories will be forced to close.

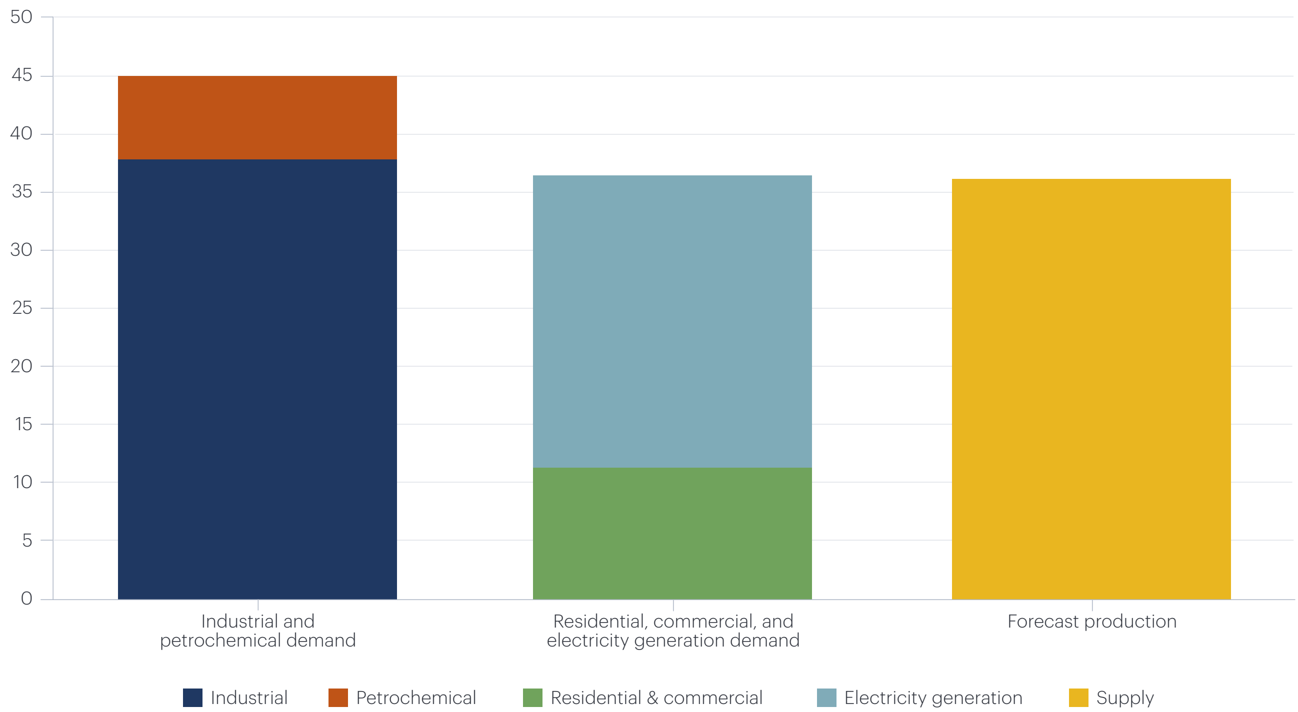
Natural gas and LPG forecast demand and production, PJ



Source: EECA, Petroleum Reserves and Mfe, Second Emissions Reduction Plan forecasts

Argosy Property Ltd 8 Willis, Stewart Dawson Corner, Wellington
Photo credit: Jason Mann

2035 Forecast natural gas/LPG demand and supply



Source: MfE, Second Emissions Reduction Plan and MBIE, Petroleum Reserves

A newly released Gas Strategies Group study says that, from 2031, the annual shortfall will be 28PJ. During winter, peak demand (which is driven by space heating) is modelled as outstripping supply by 1.1PJ per week.[14]

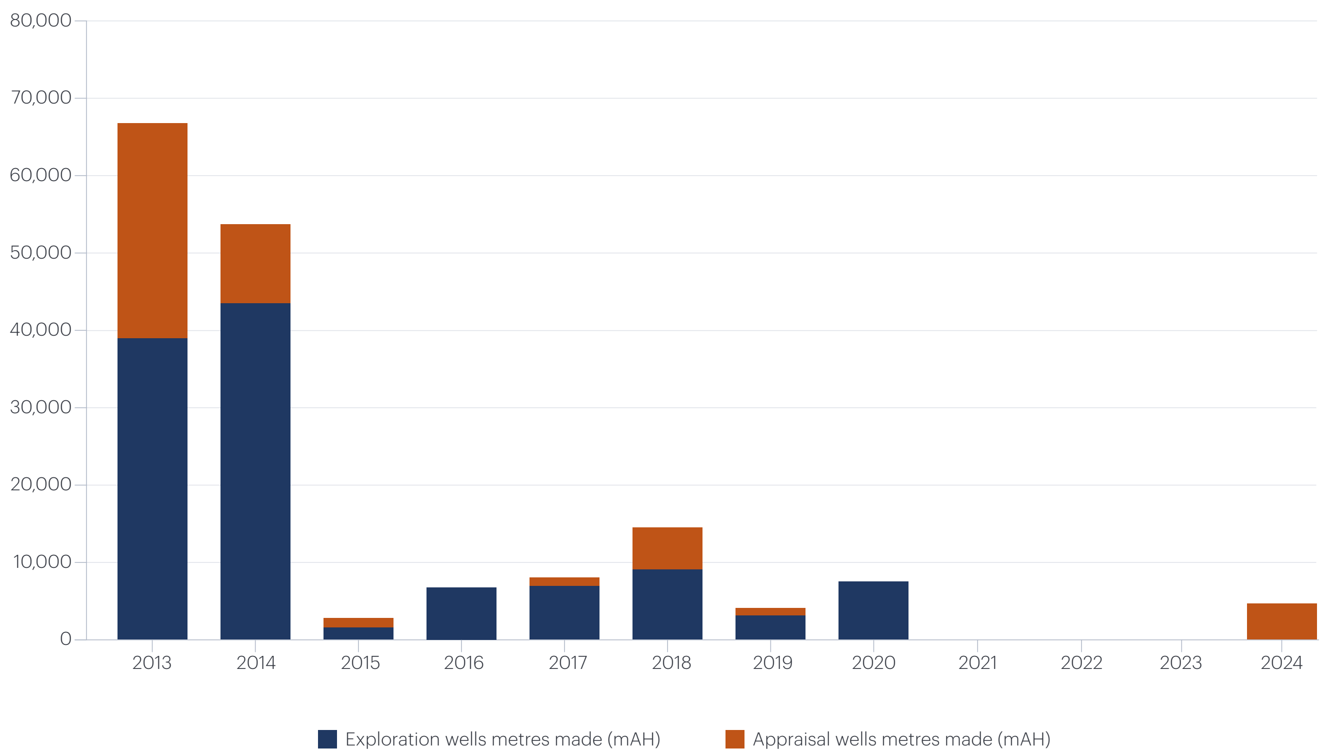
Left to its own devices, the market will destroy demand through higher prices, which will hurt every consumer of natural gas/LPG. **Without government policy interventions, it is likely that high prices will lead to industrial users closing as they are exposed to spot prices more than residential and commercial users on fixed price plans, although other users would also feel the pain, both directly and through higher electricity prices. That would mean large scale loss of jobs and export earnings for the country.** Even users that stay in business would face higher energy costs that would need to be passed on to consumers, increasing the cost of living, and making New Zealand businesses less attractive compared with international competition.

As Energy Resources Aotearoa says "New Zealand faces a natural gas shortage that risks blackouts and threatens the competitiveness of our exporters."[15]

Falling natural gas/LPG production will also make the reticulated gas network unviable, both economically as the costs of the network have to be recouped from the sale of less and less gas, and, eventually, physically as minimum gas pressures are needed for the system to operate.[16]

New exploration will not reverse this trend. Prior to the offshore oil and gas exploration ban in 2018, extensive and very expensive exploration had failed to find any

Oil and gas exploration drilling



Source: EECA, Petroleum Reserves

commercially viable fields since the discovery of Pohokura in 2000. By 2015, exploration and appraisal well drilling had all but ceased,[17] even though the 22 exploration permits at the time of the ban in 2018 remained valid. [18] Interest in new permits had declined sharply by 2016.[19]

After the oil and gas exploration ban is lifted, indications from the sector are that there is likely to be little interest in making the enormous investments that renewed exploration would require, given the prospect of future policy changes.[20]

Even if new natural gas/LPG is found in commercially viable quantities, MBIE has advised the Government that "the earliest a new field could be discovered and come into production would be the early to mid-2030s".[21] This leaves many years when industrial providers are faced with high and uncertain energy prices. New Zealand faces the risk of more industrial providers closing due to high energy prices and the likely job losses as a result.

Hoping for new fields that, even if discovered and large enough to offset the decline of existing fields, won't come online for a decade is not a sound policy for tackling this energy crisis.

Importing LNG on a large scale is prohibitively expensive and the industry has conceded it will not happen. At $1b for infrastructure alone, Meridian Energy CEO Mike Roan conceded "It looked like the costs were actually a lot higher than what we thought initially and so the smaller model is now being reviewed and looked at."[22] However, the 'small model', which would deliver only 9PJ of LNG per year to Port Taranaki, would cost $26/GJ once landing price, regasification, and capex costs are added together. That is nearly four times the average wholesale price in the decade before 2024, and obviously unsustainable for many users - quite apart from the fact it would fill just a fraction of the natural gas/LPG supply deficit.[23]

There are no serious biogas or hydrogen proposals in development to be blended with natural gas/LPG or replace it in anything like the necessary quantities to offset the decline in natural gas/LPG output in coming years.

Even the most optimistic projections only project 4PJ of new biogas production being available by the mid 2030s, in theory - and that would require the country to pay higher natural gas/LPG prices to be commercially viable.[24] Concept Consulting modelling has found the high cost of biogas means "if BioCH4 is to enable a full transition away from fossil gas, it would require carbon prices higher than $1,000/tCO2 if it were to be cost-effective for New Zealand", compared to the current carbon price of $57/tCO2.[25]

Producing any notable amount of green hydrogen would require energy inputs from electricity that are unrealistic given the looming supply constraints - at an optimistic 50KWh to make one kilogram of green hydrogen, it would take 10% of New Zealand's annual electricity supply to produce just 10PJ of green hydrogen.

The only solution is to reduce natural gas/LPG consumption and ensure what is left is available for industrial users. That process can either happen chaotically, as a result of price spikes (which impose high costs on all users) and large users shutting down, or it can be managed through government policy. The Government should focus policy on accelerating the replacement of readily substitutable, large-scale uses of natural gas/LPG.

New electricity generation — struggling to keep up

New electricity generation is going to struggle to keep up with both the need to meet new demand from the electrification of transport and industry, and replace generation from gas-fired plants as supply of natural gas/ LPG fades.

In recent years, gas-fired plants have produced around 4,000 GWh of electricity (10% of the total). This consumes 30PJ of natural gas/LPG, which is equal to 80% of projected supply in 2035. It will clearly be necessary to replace gas-fired electricity generation with other sources if there is to be any gas available for hard to electrify industrial and commercial uses.

The Second Emissions Reduction Plan, released late in 2024, projects electricity demand will rise by 6,000GWh in the coming decade, driven by electrification of transport and industry (EVs alone will consume an extra 2,000GWh).[26]

Combined, the need to replace gas-fired generation and meet growing demand means new renewable electricity generation capable of producing 10,000GWh a year (a quarter of current production) will be needed in the next decade.[27]

Transpower recently called for generators to "accelerate the speed at which planned investment is delivered if we are going to stay ahead of growing demand and provide the reliable and affordable electricity New Zealand depends on".

That will be a big ask.

New Zealand is fortunate to have huge renewable electricity potential, but the sector has not been moving rapidly enough to invest in building generation capacity. Net production capacity increased just 4% from 2014 to 2023,[28] and that is without allowing for the lower capacity factors of solar and wind that have replaced some gas generation. This under-investment constrains New Zealand's options for confronting the natural gas/LPG shortage.

Getting enough new generation by 2035 would require an enormous acceleration in construction compared to the previous decade.

The Emissions Reduction Plan forecast rooftop solar will deliver 1,000GWh of electricity a year by 2035.[29] According to Transpower, there are 1,700MW of new electricity generation projects, nearly all solar, under construction currently or at the detailed design phase and expected to be online within two years.[30] However, these nameplate generation numbers can be misleading. The intermittency of solar (a panel generates less than 20% of its rated capacity on average per hour, due to nighttime and clouds) means an extra 1,000MW of solar capacity only generates around 1,500GWh of electricity a year. Wind turbines have a higher capacity factor, around 35%, but less new wind generation is in the pipeline.

There are a large number of generation projects in the 'investigation' and 'application' stage, which could, if built, help to meet the supply shortage. A significant number of these projects are 'on hold', which usually means 'pending higher electricity prices'.[31] **New Zealand's electricity market settings discourage the existing large generators from making investments in new capacity if that is going to decrease the price of electricity from their existing plants - effectively giving them negative revenue.**

Peak hourly demand each year is over 50% above the hourly average and typically occurs during cold winter evenings due to residential space and water heating, when the sun isn't up and the wind isn't blowing – meaning the new generation capacity coming online will be least able to help meet the need. Transpower data shows that July has the lowest average wind generation,[33] while also typically being the month with the second least sunshine hours and the lowest temperatures. Electricity generation from gas also tends to be highest in winter, in response to higher demand for electricity for space heating, with 31% of total gas generation occurring in Q3, on average.[34]

Large generation buffers and larger amounts of electricity storage will be needed to avoid the risk of shortages at winter peaks, unless the size of demand peaks can be reduced.

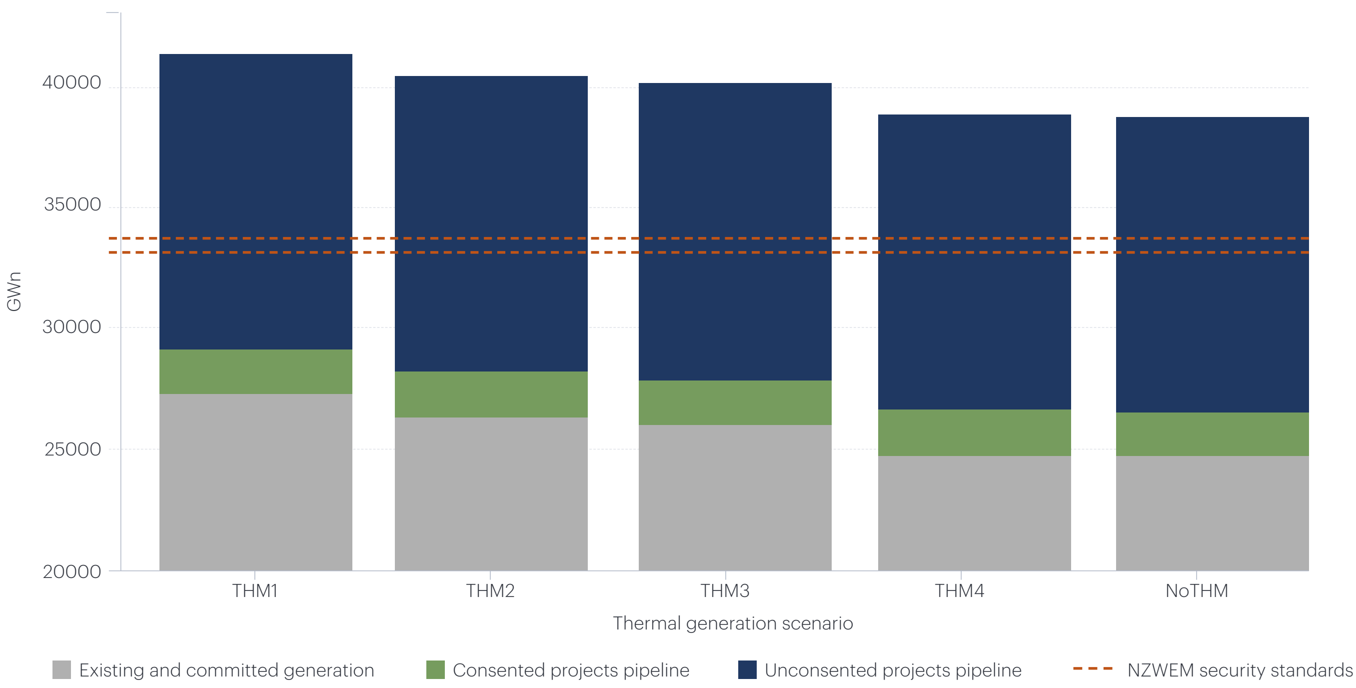
Battery costs are decreasing significantly and would be needed in large quantities to provide security of supply for winter peak demand hours. Batteries, however, are not suitable for storing energy between seasons and pumped hydro storage is off the table for the foreseeable future. This leaves only the existing hydrolakes for energy storage to combat dry years. For this to be effective hydrodams will need to be able to stay full for longer periods - meaning either other generation or improved efficiency on the demand side to reduce the need for hydro generation.

Coal will not be able to make a significant contribution to addressing this situation. A recent KPMG/Concept Consulting report[35] has noted that the increasing use of intermittent renewables in the coming decade will increase the risk of supply shortages, which has been used to justify keeping the Rankine units at Huntly online to burn coal. However, with a peak output of 750MW, these units do not have the capacity to be able to cover the capacity supplied by gas currently.

Transpower has recently warned that its "lower security standard" (a measure of the safety margin between expected demand and supply) will be breached from winter 2026, four years earlier than previously thought.[36]

In its Security of Supply Assessment 2025,[37] Transpower shows that the country will need most of the additional supply to come from projects that are not yet consented to meet the supply security standard by 2034, and even adding the full 'unconsented' pipeline and using coal to keep Huntly open will barely be enough to maintain security of supply at peak hourly demand.

Energy available to meet NZ-WEM upper and lower security standard in different thermal scenarios



Source: Transpower, Security of Supply Assessment, 2025

The tight electricity market outlook in coming years is a recipe for more price spikes and increased risk of genuine shortages. This increases costs to businesses and families and may discourage economic investments that are dependent on affordable and reliable electricity supply such as manufacturing, datacentres, and AI.

The Electricity Authority has launched consultation on an "Emergency Reserve Scheme", to be in place ahead of winter 2026.

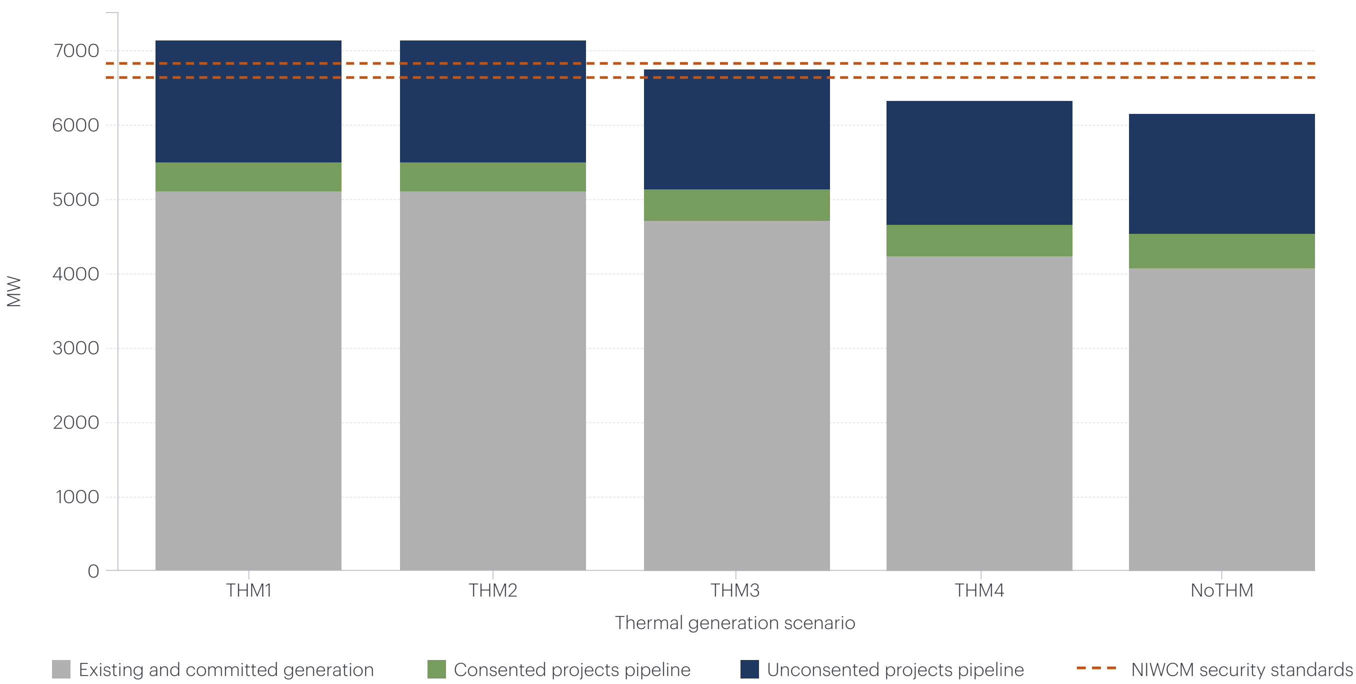
The proposal is not for additional energy reserves but for contracts to be established that allow for emergency shutdowns of manufacturers in the face of energy shortages during winter demand peaks.

The concept is to find the 'least cost' industrial demand that can be turned off during winter demand peaks, driven by space and water heating in buildings, that would otherwise lead to "uneconomic load shedding" - involuntary blackouts.

While it is unclear which businesses would temporarily lose power, this would, obviously, result in reduced output from the affected energy users, potentially reducing output and reducing exports/requiring an increase in imports. While the company itself would be compensated under the scheme, the cost would ultimately be spread over the economy as a whole.[38]

To avoid a situation where the tight supply of natural gas/LPG and electricity destroys manufacturing businesses, costs New Zealanders their jobs, and increases the cost of living, we need to find demand reductions that are economically viable. In particular, we need solutions that can reduce the strain from winter peak demand. Fortunately, there is an area of energy use that is large enough to be significant, especially in winter, where energy efficiency options are available at low-to-negative net cost, and current energy use is so inefficient that the available savings can meaningfully impact the energy balance: heating.

Capacity available to meet NI-WCM upper and lower security standard in different thermal scenarios



Source: Transpower, Security of Supply Assessment, 2025

University of Auckland, B201 Building
Photo credit: Mark Scowen

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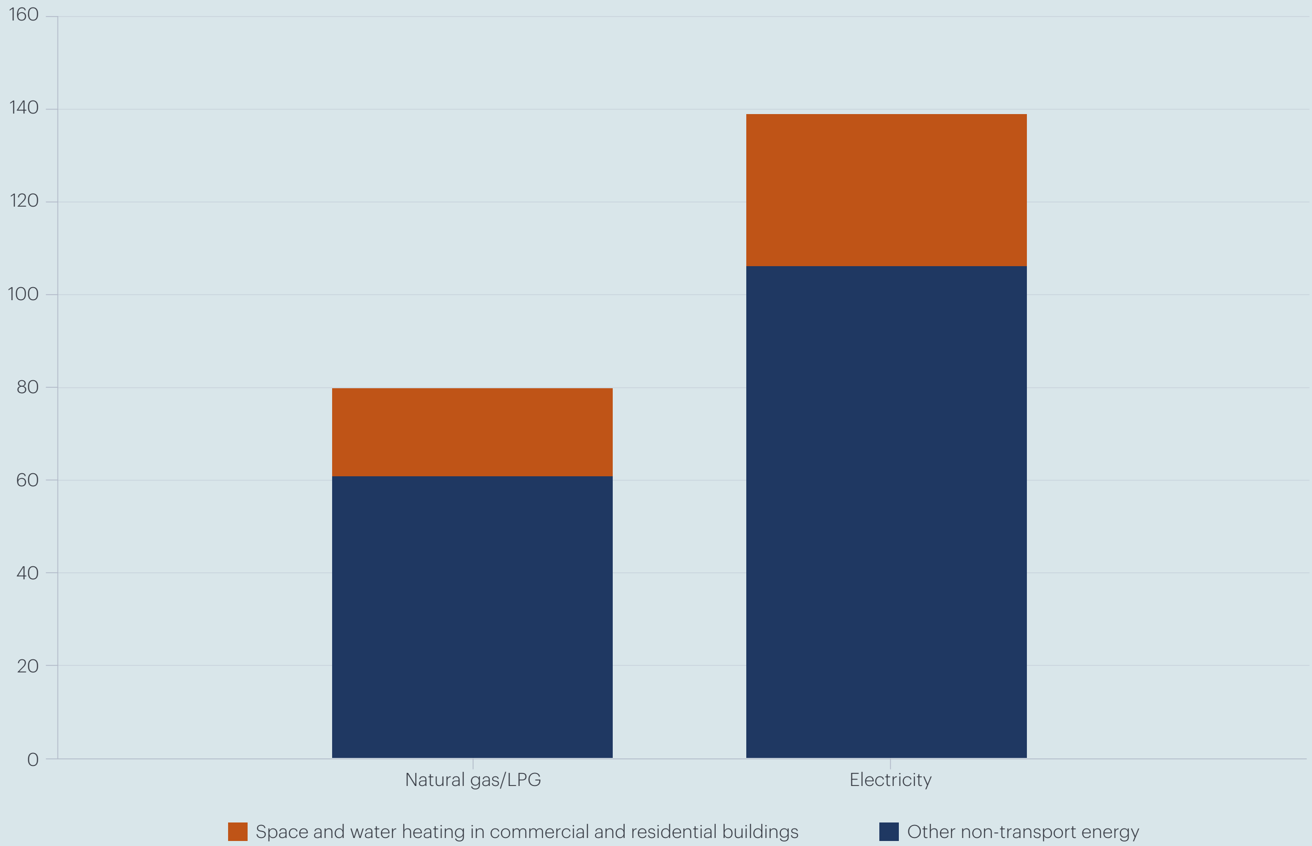
Heating our buildings and water

Heating commercial and residential buildings uses a surprisingly large amount of New Zealand's electricity and gas supplies, especially in winter. In total, 79PJ of New Zealand's 335PJ of non-transport energy is used for space and water heating. Of this, 51PJ is in commercial and residential buildings[39] and supplied by natural gas/LPG or electricity.[40]

Electricity and natural gas/LPG use for space and water heating in commercial and residential buildings, PJ



Source: EECA, Energy End Use Database (note: graph is of 'energy end use', so doesn't show natural gas/LPG used for electricity generation, or used in chemical production)

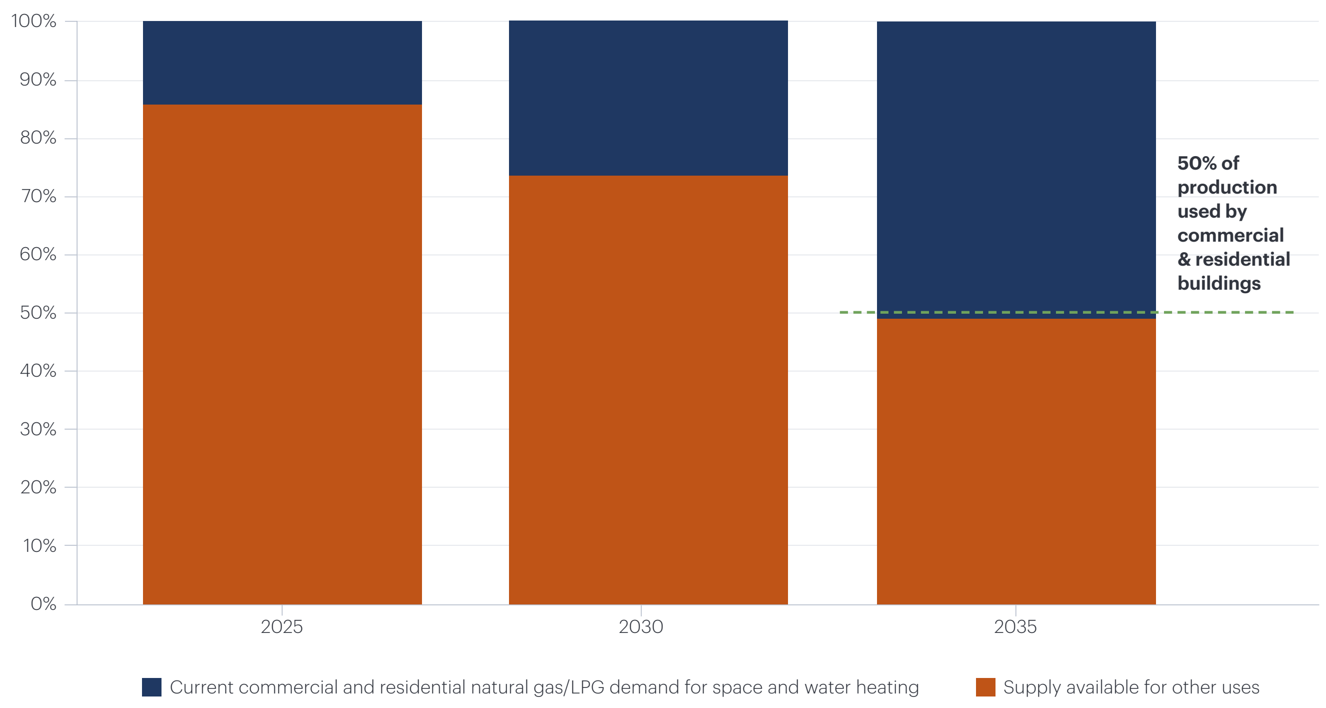
Natural gas/LPG

In 2023, 12PJ of natural gas/LPG was used for space heating in commercial and residential buildings. and 6PJ was used for water heating. Of this, residential space heating and water heating each used over 5PJ.[41] In other words, natural gas/LPG used in residential and commercial buildings accounts for 14% of current supply. **If unchanged, this 18PJ of demand will account for 26% of supply by 2030 and 50% by 2035, which would make natural gas/LPG unavailable to industrial users.**

Natural gas/LPG demand for space heating increases sharply in winter, with 40% of annual residential fossil demand taking place in Q3.[42] Commercial demand for natural gas/LPG also spikes in winter, to a slightly lesser degree, which can also be attributed to space heating.

Despite the fast decline in natural gas/LPG production, new connections to buildings are still being made. Although the total number of gas connections is now decreasing, NZGBC analysis shows that 5,000 new homes are connected to the natural gas network each year, with commercial connections and bottled LPG users on top of that.

Commercial and residential demand for space and water heating is set to squeeze out other gas users



Source: EECA, Gas Statistics

Electricity

In 2023, 4,600GWh of electricity was used for space heating in commercial and residential buildings and 4,500GWh was used for water heating.[43] Electricity demand for space and water heating in commercial and residential buildings accounted for 23% of total generation.

Census 2023 data shows that 69% of households now have heat pumps as a main form of space heating. However, 39% still report using resistance electric heaters as a main space heating source (a small share use both)[44]. Despite the lower number of homes using resistance heaters, EECA data shows resistance heaters use more electricity in homes than heat pumps, due to their much lower energy efficiency.

In commercial and residential buildings combined, heat pumps used 1,800GWh of electricity a year, while resistance heaters used 2,900GWh.

In terms of water heating, heat pumps are only found in 3% of households, according to EECA research, with nearly all the electricity demand coming from resistance hot water cylinders.

As with natural gas/LPG, residential electricity demand for heating spikes in the winter, becoming the largest source of electricity demand during daily peak hours in the morning and evening during the colder months.[45] This coincides with the period of lowest solar electricity production. With the majority of new electricity generation in the coming decade set to be solar, this means that households' winter heating needs will be a key driver of the need to use gas or coal for generation to plug solar's intermittency. In this context, the scale of residential heating demand in winter will have a significant impact on the supply buffer and, consequently, the price and reliability of electricity.

Luggate Rise, Christchurch

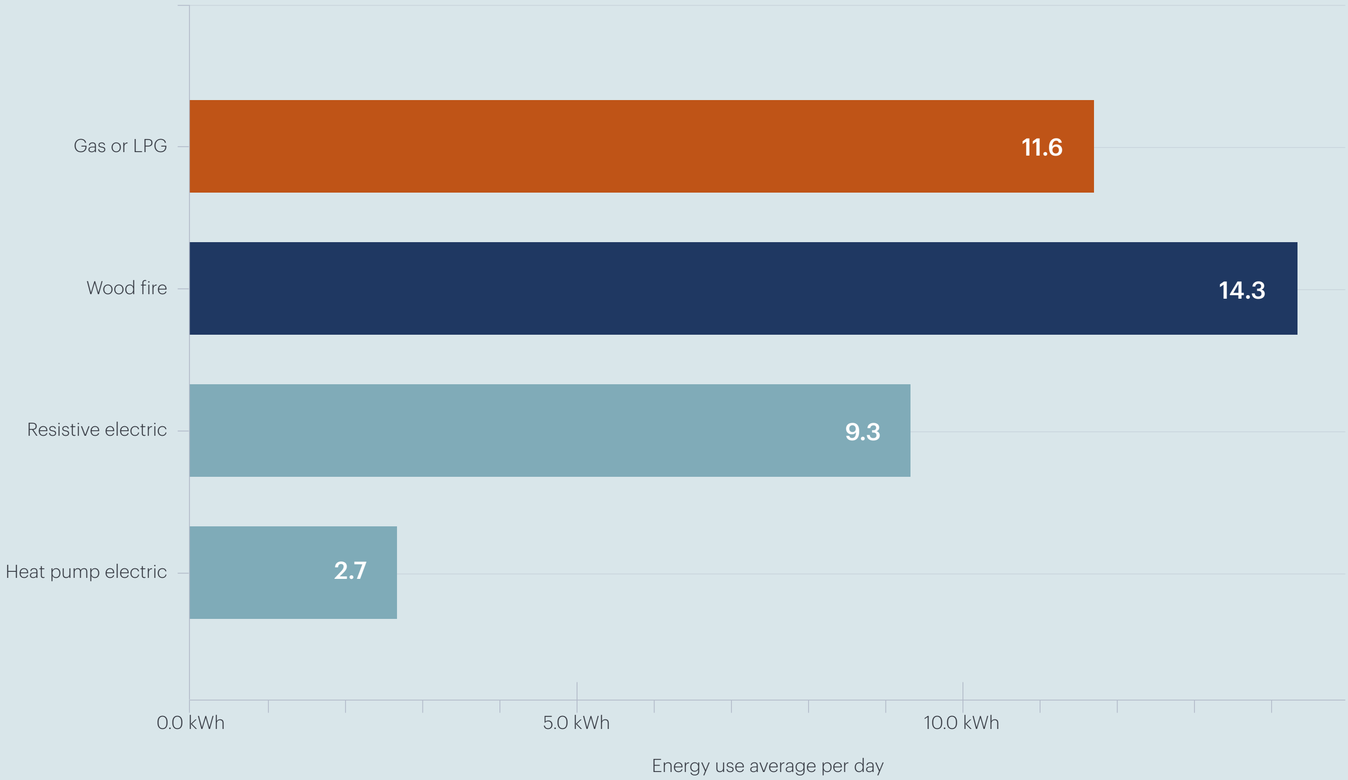
4

Ready solutions to reduce residential energy use for heating

Heat pumps offer much more energy efficient and cost-effective alternatives to both natural gas/LPG and resistance electric heating systems, both for space heating and water heating.

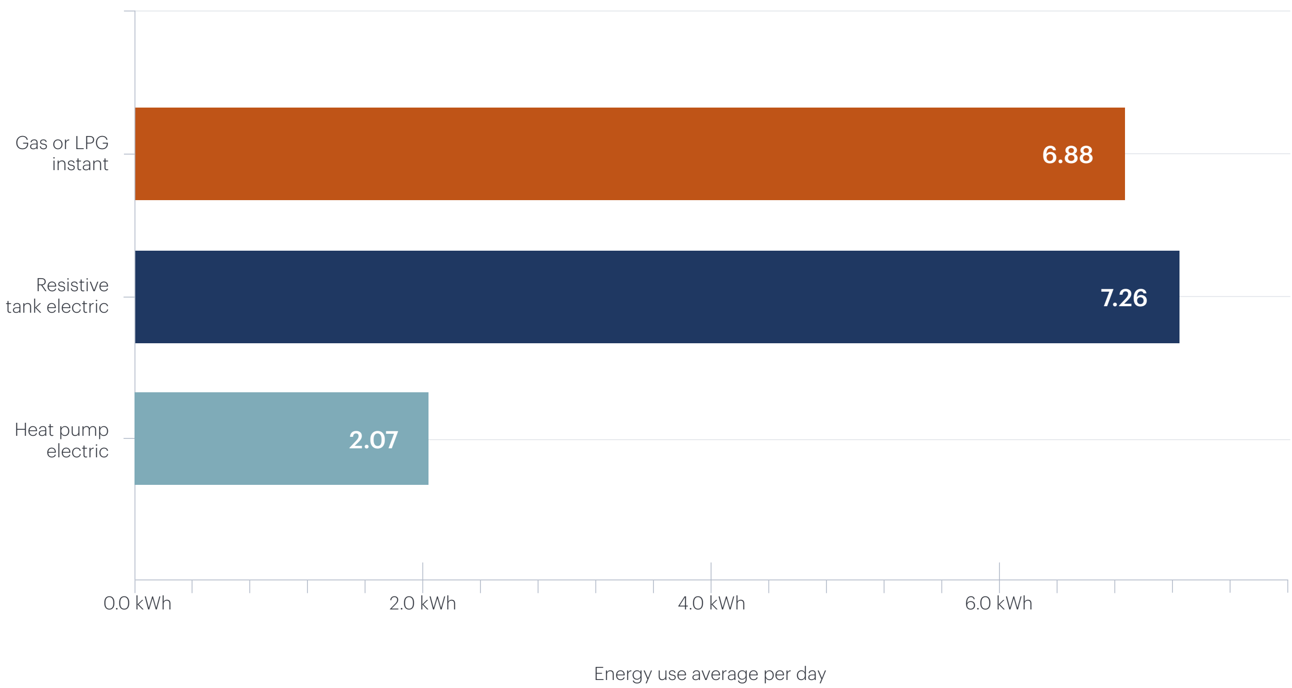
Rewiring Aotearoa's analysis shows, on average, a home converting from gas space and water heating to heat pumps reduces energy use for those purposes by 74%. Converting from resistance space and water heating to heat pumps saves 71%.

Space heating energy use per day by type — Lower values are more efficient



Source: Rewiring Aotearoa, Electric Homes figures

Water heating energy use per day, less is more efficient – Average home



Source: Rewiring Aotearoa, Electric Homes figures

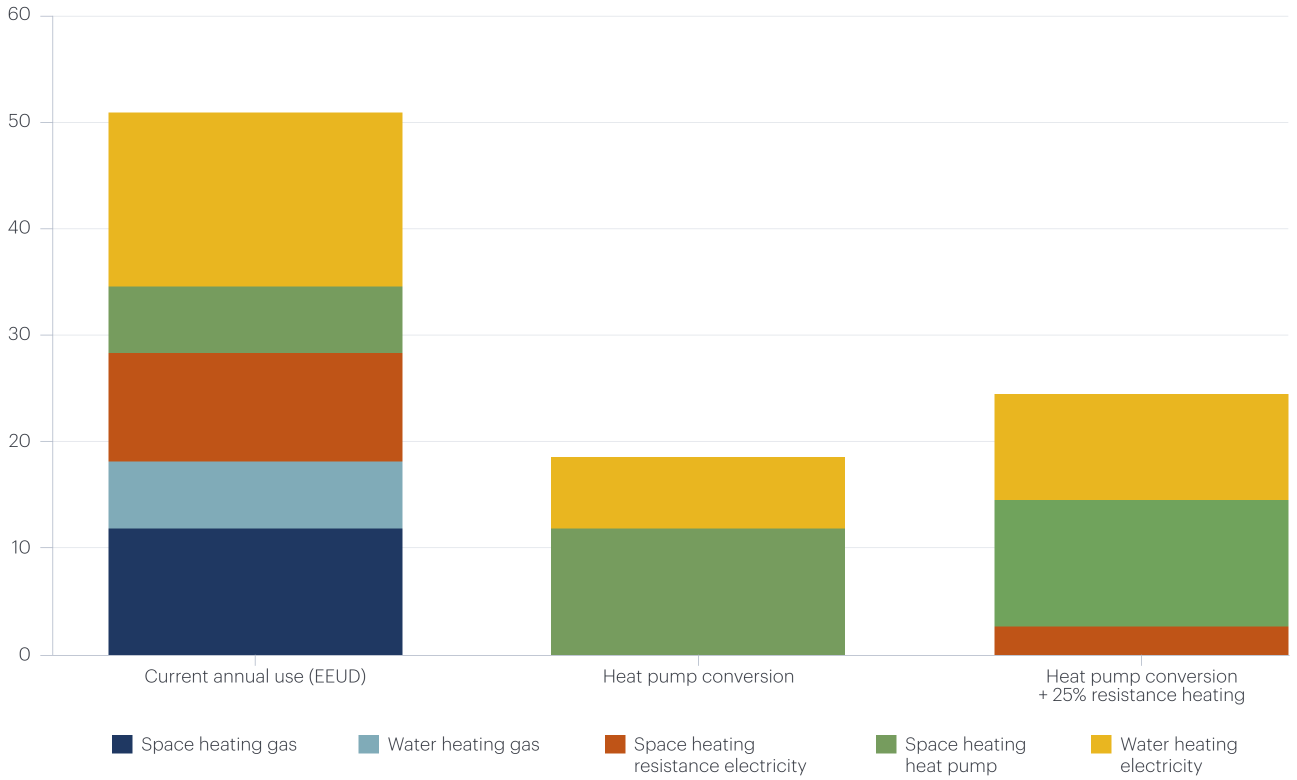
In fact, so efficient are heat pumps that, as will be shown in detail below, the extra electricity demand from replacing gas heating with heat pumps can be more than offset by also replacing electric resistance heaters with heat pumps.

While there has been strong progress towards adoption of heat pumps in recent years for space heating, there remains a significant amount of energy use at a national level that could be eliminated by switching all homes to heat pumps. As discussed above, resistance heaters still consume more electricity for space heating than heat pumps do. For water heating, adoption of heat pumps has only occurred at a low level so far (~3% of households),[46] meaning there are very large energy savings to be realised by switching from gas and resistance heat pumps as replacement becomes necessary.

To illustrate the savings available, this graph shows current energy use in residential and commercial buildings for space and water heating, compared to a scenario where all that consumption is replaced with heat pumps. A second scenario has 25% of current resistance space heating remaining in use in addition to heat pumps (for uses such as warming bedrooms and to recognise that some families will choose to keep their homes warmer) and 25% of current resistance hot water systems remaining in use rather than heat pump systems.

These scenarios are obviously optimistic in terms of how quickly transition could occur, but they serve to illustrate the size of energy savings that are on offer from accelerating the conversion to heat pumps.

Annual energy use in heat pump conversion scenario after roll out



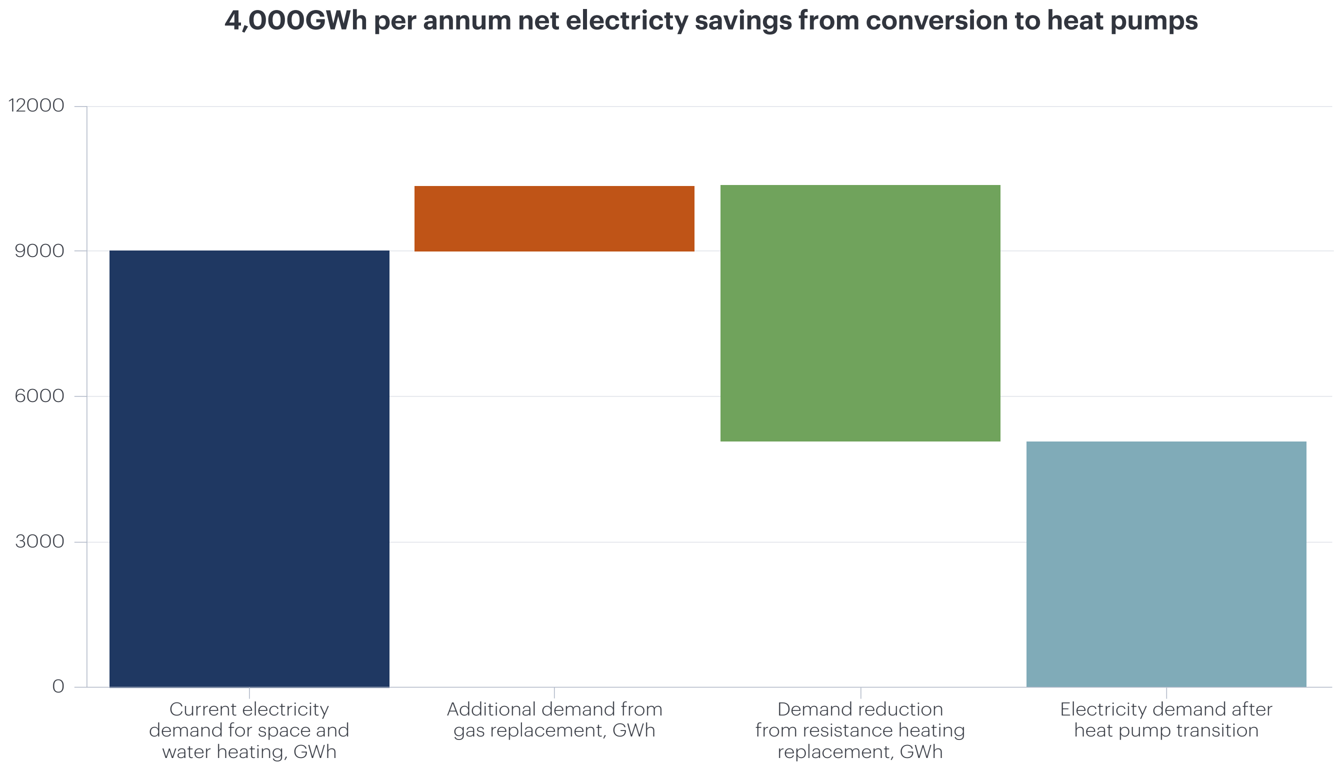
Source: Calculated from EECA Energy End Use Database and Rewiring Aotearoa, Electric Homes figures

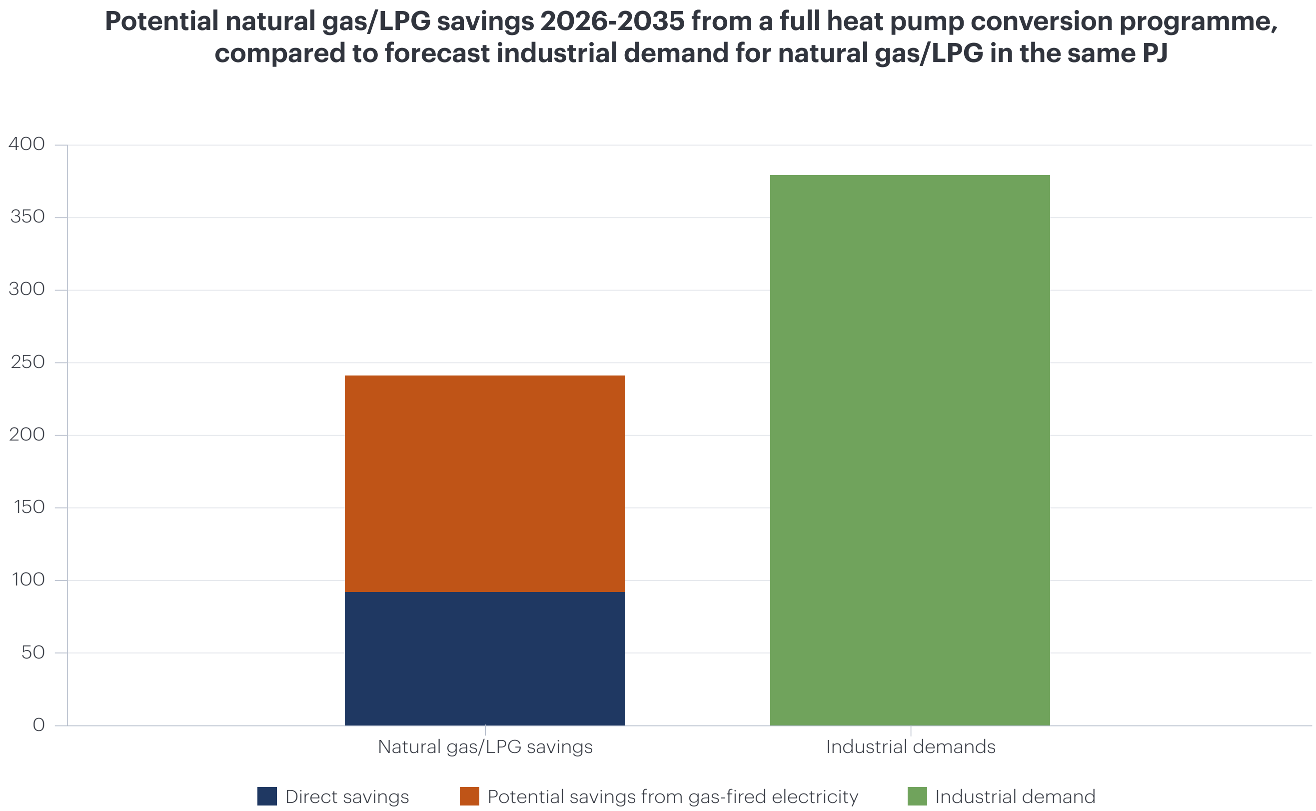
The heat pump replacement scenario saves 15% of current annual natural gas/LPG supply (18PJ per year) and 10% of annual electricity supply (4000GWh per year). Under the heat pumps +25% of resistance heating scenario, there is a demand reduction of 15% of current annual natural gas/LPG supply (18PJ per year), along with 6% (2400GWH per year) of electricity.

Under the heat pumps + 25% of resistance heating scenario, 15% of natural gas/LPG and LPG supply is saved, along with 6% of electricity.

A full heat pump transition, both through avoiding direct consumption and reduced need for gas electricity generation, would save 18PJ-48PJ of gas a year, 14%-38% of current supply, depending on how much gas generation is avoided.

If a full transition to heat pumps was spread evenly over the next decade, by 2035 up to 240PJ of natural gas/LPG would have been saved - a quarter of remaining reserves.
This would extend the lifetime of the remaining reserves enough to keep hard to electrify industries in operation for years to come.





Source: Calculated from EEC Energy End Use Database and Rewiring Aotearoa, Electric Homes figures, and Second Emissions Reduction Plan forecasts

Replacing resistance heating with heat pumps saves more electricity than the additional demand created by replacing gas with heat pumps.

Converting current use of natural gas/LPG for space and water heating to resistance electric heating would not have the same level of impact. Only 2PJ of energy would be saved. And, while natural gas/LPG savings would still total 15% of current supply (18PJ), electricity demand would increase by 4,500GWh, or 11%.

Heat pumps have advantages over other approaches to confronting the looming energy crisis, on top of the constraints on gas and electricity supply already discussed:

- Unlike power plants or gas drilling infrastructure, they are small, modular technology meaning each investment is a small unit that can be done quickly without major planning and construction lead times.
- Being many small units makes them easier to fund compared to trying to find funding for a project with multi-decade pay-off.
- There are no requirements for resource consents or even building consents, which bedevil large energy projects.
- They are off-the-shelf technology with a wide variety of suppliers, eliminating the costly supplier choice decisions and supply chain risks that come with larger infrastructure projects.

Conversion of space and water heating in residential and commercial buildings would lower the scale of seasonal and daily demand peaks significantly. There is an obvious efficiency in lowering the amount of energy needed to provide heat in those cold times, rather than investing in supply capacity to meet those peaks.

Accelerating heat pump adoption is one of the most effective policy tools available to the government to overcome the energy crunch that the decline in gas production coupled with electrification of industry and transport is precipitating.

Replacing gas and resistance heaters would also have co-benefits including:

- Reduced costs to households and businesses. Households alone would save $1-$1.5b dollars a year in reduced electricity and gas bills.
- Improved air quality. Gas appliances release nitrogen dioxide, carbon monoxide, particulate matter, methane and other toxic compounds. Research suggests they are linked to increased rates of respiratory illness.
- Fewer building fires. Gas and resistance electrical appliances are a major cause of building fires.

This report assumes strong growth of solar PV as set out in Emissions Reductions Plan 2.

5

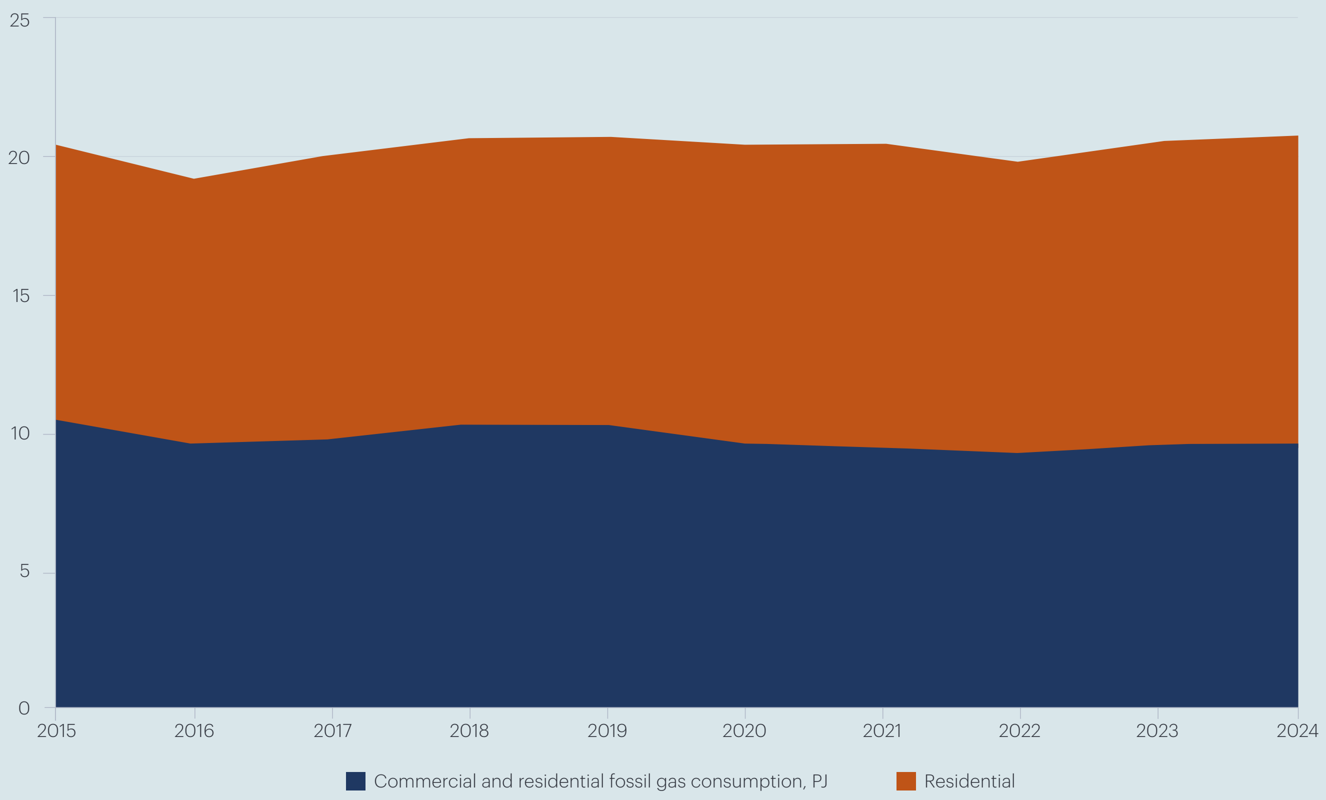
Why is Government action needed?

Heat pumps are cheaper to operate than gas and resistance appliances and they are becoming increasingly favoured by building owners. So, the question may be asked, why does the Government need to do anything? Isn't this a solved problem?

Households are making progress in the adoption of heat pumps and decreasing purchases of gas hot water systems, but commercial and residential natural gas/LPG consumption is still climbing.

The Second Emissions Reduction Plan forecasts only minor reductions in commercial and residential use of natural gas/LPG by 2035 under current policies.

Commercial and residential fossil gas consumption, PJ



Source: MBIE Gas and Oil Statistics

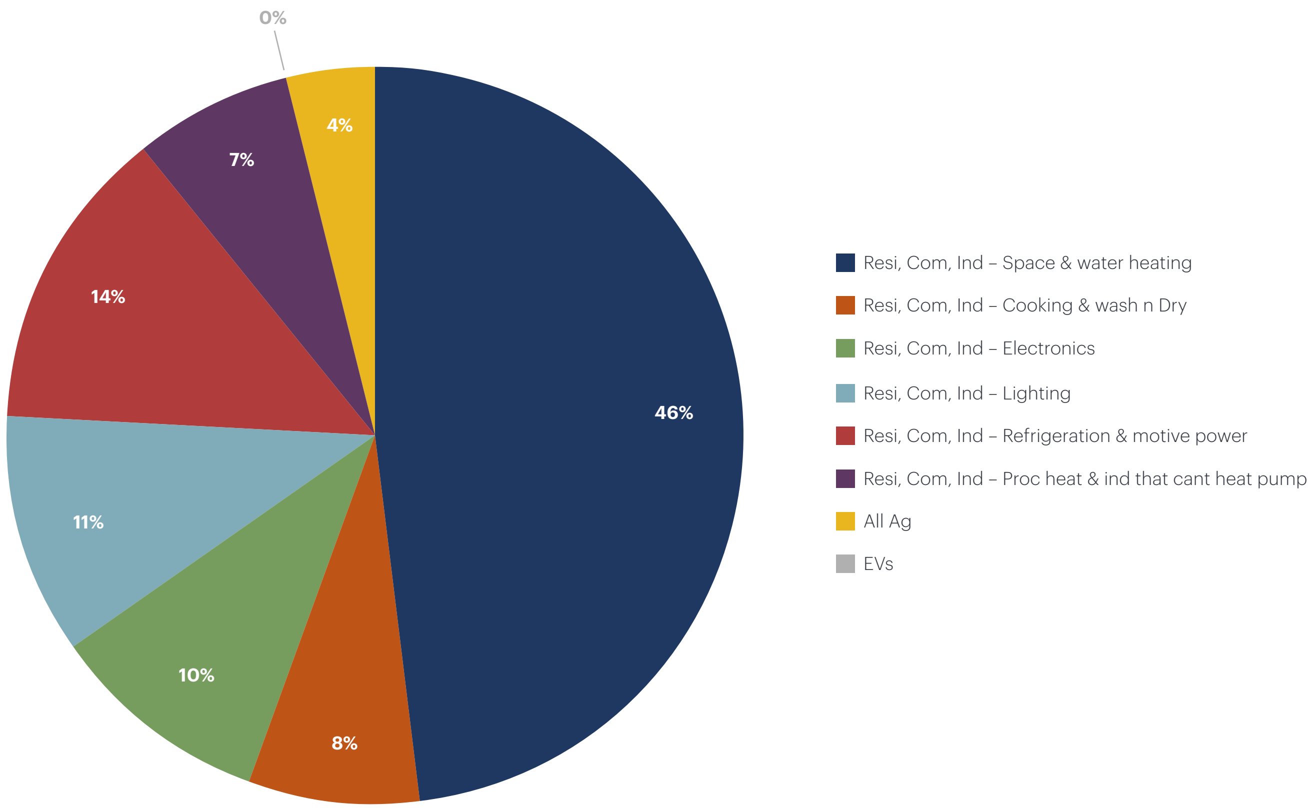
The current pace of heat pump adoption is not enough to meet the immediacy of the crisis. If commercial and residential use of gas (and demand for electricity generated by gas) doesn't come down, then industry's demand will be forced to come down. Jobs are already being lost. Without action, more jobs and key manufacturing sectors will be lost as industrial production closes down. New Zealand faces the risk of deindustralisation due to this energy crisis, costing the country its local capacity to produce products that are both economically and strategically important.

Government action should concentrate on lowering costs and providing market signals/requirements to adopt heat pumps. The data suggests that upfront cost is seen as the major barrier to converting to heat pumps by homeowners.

In a recent EECA survey,[47] 67% of respondents said they would only replace their heating system if it broke down. 76% said upfront cost would be the main consideration for those who don't already have a heat pump. 58% said the cost of a heat pump is the main disadvantage of the system and only 37% were aware of the lower running costs.[48]

Familiarity with hot water heat pumps is low, with only 23% saying they know "a little" and only 4% "a lot" about them. Despite this, 36% say they are "very likely" or "quite likely" to buy a hot water heat pump when changing hot water systems. Again, cost is seen as the main barrier to choosing to convert to a heat pump.

Contribution to system peak demand (MW)



Source: MBIE electricity statistics and EECA Energy End-Use database

University of Auckland, B201 Building
Photo credit: Mark Scowen

6

What other jurisdictions are doing

Most OECD countries are taking steps to support installation of and conversion to heat pumps.

Australia

The Australian state of Victoria is facing a similar situation to New Zealand regarding natural gas/LPG supply. The state's gas production is waning quickly, although less acutely than New Zealand's, and imports are insufficient.

To combat this, the State Government released a Gas Substitution Roadmap in 2022, which it has been progressing ever since.[49] Policies under the Roadmap include:

- Subsidies for both households and businesses to replace fixed gas and resistance heaters with heat pumps. Subsidies vary depending on the systems being replaced and installed, with maximums of AUD$5,530 for homes and AUD$8,820 for businesses.[50]
- Rebates of up to AUD$1,400 for homeowners on hot water heat pumps and solar hot water heaters.[51] Subsidies of up to AUD$910 for homes and businesses to replace inefficient gas and resistance hot water systems with heat pumps or solar hot water heaters.[52]
- All new homes required to be all-electric from 2027[53]
- From 2027, households required to replace end-of-life gas hot water systems with heat pumps or other efficient alternatives, effectively banning installation of new hot water systems[54]

New South Wales has also moved to provide heat pump subsidies.

An Institute for Energy Economics and Financial Analysis report found an investment of AUD$3.5b in electrification of all new and existing residential and commercial buildings (except commercial kitchens) would save AUD$6.3b over 10 years, with a net present value of AUD$1.9b.

Europe

Driven by a strategic imperative for independence from Russian gas imports, many European countries are offering incentives for businesses and households to convert to heat pumps and banning new gas installations. Examples include:

- **United Kingdom** - up to £7,500 towards an air source heat pump,[55] gas connections for new homes banned
- **France** - up to €4,000 for replacing coal, gas, or oil boilers, with air/water heat pumps[56]
- **Denmark** - DKK17,000 for replacing gas or electric space heating with a heat pump, and DKK27,000 for replacing gas or resistance water heating with a hot water heat pump[57]
- **Ireland** - Up to €6,500 for replacing existing heating with heat pumps or hot water heat pump systems[58]

United States

Households can claim 30% rebates on the cost of installing air heat pumps and heat pump water heaters, up to a maximum of USD$2,000 each. State incentives can also apply.[59]

Canada

Provinces have a range of incentives. For example, Ontario has launched a programme of rebates including up to CAD$7,500 for a cold climate air source heat pump and CAD$500 for a heat pump water heater.[60]

Argosy Property Limited, 8 Willis Street, Stewart Dawson Corner, Wellington
Photo credit: Jason Mann

7

Policies to accelerate the heat pump transition

The set of policies outlined below are interlocking to cover the range of household types and commercial buildings. They *require* builders and landlords to choose heat pumps and stop using natural gas/LPG; *require* heating and hot water system providers to stop selling natural gas/LPG and inefficient electric systems; *subsidise* middle income families to replace their old natural gas/LPG and electric resistance systems with heat pumps; and *heavily* assist lower income households to make the switch to heat pumps. In conjunction with these policies should be improvements to housing insulation and the availability of time of use controls.

Subsidise heat pumps and hot water heat pumps

Subsidies are a powerful driver of behavioural change. In a recent EECA survey, respondents identified cost as the most important consideration in deciding whether to buy a heat pump or hot water heat pump.

Subsidies have been successful in driving heat pump uptake in other countries, and would likely not have to be as generous in New Zealand as they are in Europe, where heat pumps are a less well-known concept.

The subsidy could be achieved using the Warmer Kiwi Homes programme, which provides subsidies of up to 80%/$3,450 for heat pumps for a narrow group of low income homeowners. The programme could be expanded to include subsidies for both heat pumps and hot water heat pumps when replacing existing gas or electric resistance systems. It could be opened to middle income families and businesses, with a lower subsidy percentage rate and a smaller maximum dollar amount. Alternatively, as proposed by Local Government NZ, the Ratepayer Assistance Scheme could be used.

This should be supported by an information campaign on the lower operating costs of a heat pump and water heat pump relative to gas and resistance electric systems.

Warmer Kiwi Homes should also continue to support insulation improvements to lift the energy efficiency of low income homes, by giving access to a broader range of households and subsidising a wider range of insulation options. As part of this, a programme to deep retrofit 100,000 low income, poor quality homes should be undertaken. These targeted homes are both outsize energy users and a driver of energy poverty.

To support these retrofits, banks should be encouraged to review their low-interest loans to cover heat pumps and hot water heat pump systems and offer more attractive terms.

Phase-out gas hot water heaters by requiring them to be replaced with hot water heat pumps at the end of their life

It makes no sense to be installing new gas appliances when the fuel they need is going to effectively run out over the next decade.

Hot water systems have a relatively short lifespan, usually around 10 to 15 years. This creates a high rate of turnover, with 125,000 sold per year according to EECA data. 40,000 of these were gas units in 2024, down from a high of 56,000 in 2021.[61]

According to EECA survey data,[62] 34% of households, 550,000 homes, report having gas hot water systems and the EECA Energy End Use Database shows they account for 87% of the natural gas/LPG used for water heating in residential and commercial homes.[63] So, this is the key use case to target.

Gas water heater sales imply that the majority of homes with gas water heaters have systems over five years old. If sales of gas water heaters for commercial and residential buildings were ended in 2026, by 2035 the majority of existing units will be over 15 years old and all will be over 10 years old - meaning they will have already needed to be replaced or will be approaching the end of their useful lives. Combined with the Warmer Kiwi Homes subsidy, this should see most gas units replaced within a decade.

End the sale of portable and fixed gas space heaters

Similar to water heaters, investing in new gas space heaters may not be the most effective use of resources given the current rapid decline in supply of natural gas and LPG.

12% of households reported using gas as a main source of heating in Census 2023 - 155,000 with fixed heaters and 41,000 portable gas heaters.[64] EECA's consumer survey indicates most of these units are over six years old and many over ten years old - likely to need replacement in the coming decade, with the Warmer Kiwi Homes subsidy encouraging this process.[65]

Improve energy efficiency requirements and availability of time of use control

The energy efficiency standards for both fixed electric heating and electric hot water systems should be increased in stages to effectively require new systems to be heat pump systems. Water systems should also be required to have time of use controls that enable electricity load spreading to lower demand peaks. Current units will be replaced as they age, accelerated by the Warmer Kiwi Homes subsidy.

Require new buildings to be 'all-electric'

Continuing to equip new homes and buildings with natural gas or LPG is likely to lead to increased costs in the future, as these systems could require conversion to electric alternatives within the next decade due to declining supply.

Instead, the Building Code should be improved to require new buildings to use heat pumps for space and water heating, either explicitly or implicitly through limits on overall predicted/modelled electricity demand at building consent.

Use tax and depreciation rules could accelerate installation of heat pumps for commercial buildings

The Government has launched a new Investment Boost policy to offer businesses faster tax deductions on capital investments. This could be bolstered further for heat pump and water heat pump purchases and installation to accelerate the adoption of these technologies.

Appendix

NATURAL GAS/LPG WELLS, RESERVES, AND PRODUCTION

Date	Exploration Well Metres Made (mAH)	Appraisal Wells Metres Made (mAH)	Natural Gas and LPG Reserves PJ	Natural Gas Production PJ	LPG Production PJ
2013	39082	27891		183	10
2014	43485	10359		204	12
2015	1495	1232		189	11
2016	6692	0		196	9
2017	6885	1069		194	9
2018	8985	5426		175	9
2019	3076	914		184	8
2020	7298	0	2100	180	8
2021	0	0	2176	158	8
2022	0	0	2058	143	8
2023	0	0	1708	148	7
2024	0	4505	1357	119	7
2025			981		

Source: MBIE gas, oil, and petroleum reserves statistics

NATURAL GAS/LPG AND ELECTRICITY FORECAST PRODUCTION

Date	Natural Gas Production forecast PJ	LPG production forecast PJ	Residential demand forecast PJ	Commercial demand forecast PJ	Industrial demand forecast PJ	Electricity demand forecast PJ	Petrochemicals demand forecast PJ	Electricity demand forecast (GWh)
2025	107	6	7	7	38	34	73	41014
2026	100	5	6	7	38	32	73	41273
2027	95	5	6	6	38	31	73	41963
2028	81	3	6	6	38	32	40	42417
2029	74	3	6	6	38	31	40	43086
2030	67	3	6	6	38	27	7	43234
2031	61	2	6	6	38	26	7	43608
2032	56	2	6	6	38	26	7	43989
2033	50	2	6	6	38	26	7	44404
2034	44	2	6	6	38	25	7	44869
2035	35	1	6	6	38	25	7	45319

Source: MBIE petroleum reserves statistics, Second Emissions Reduction Plan Technical Annex

ENERGY AND MONETARY SAVINGS FROM HEAT PUMP CONVERSION - CALCULATIONS

Current annual use (EEUD)

PJ	Commercial	Residential	Total
Space Heating Gas	6.612	5.232	11.844
Space Heating Resistance Electricity	4.996	5.248	10.244
Space Heating Heat pump	1.844	4.414	6.258
Water Heating Gas	0.815	5.479	6.294
Water Heating Electricity	3.582	12.716	16.298
Total	**17.849**	**33.089**	**50.938**

Sources: EECA Energy End Use Database, MBIE energy prices

ENERGY AND MONETARY SAVINGS FROM HEAT PUMP CONVERSION - CALCULATIONS

Heat Pump conversion			
PJ	**Commercial**	**Residential**	**Savings**
Space Heating Gas	0.000	0.000	11.844
Space Heating Resistance Electricity	0.000	0.000	10.244
Space Heating Heat pump	4.833	7.155	-5.731
Water Heating Gas	0.000	0.000	6.294
Water Heating Electricity	1.267	5.274	9.757
Total	**6.100**	**12.430**	**32.409**

Sources: EECA Energy End Use Database, MBIE energy prices

ENERGY AND MONETARY SAVINGS FROM HEAT PUMP CONVERSION - CALCULATIONS

Heat Pump conversion + 25% resistance

PJ	Commercial	Residential	Total
Space Heating Gas	0.000	0.000	11.844
Space Heating Resistive Electricity	1.249	1.312	10.244
Space Heating Heat pump	4.833	7.155	-5.731
Water Heating Gas	0.000	0.000	6.294
Water Heating Electricity	2.321	7.547	6.430
Total	**8.404**	**16.014**	**26.520**

Sources: EECA Energy End Use Database, MBIE energy prices

ENERGY AND MONETARY SAVINGS FROM HEAT PUMP CONVERSION - CALCULATIONS			
Savings			
PJ	**Heat pump conversion**	**Heat pump conversion + 25% resistance**	
Gas savings PJ	18.138	18.138	
Electricity savings GWh	3,964	2,383	
Household annual cost savings, rounded			
	Gas $	**Electricity $**	**Total**
Heat pump conversion	526,000,000	1,023,000,000	1,549,000,000
Heat pump conversion + 25% resistance	526,000,000	654,000,000	1,180,000,000
Commercial annual cost savings			
	Gas $	**Electricity $**	**Total**
Heat pump conversion	365,000,000	444,000,000	809,000,000
Heat pump conversion + 25% resistance	365,000,000	208,000,000	573,000,000

Sources: EECA Energy End Use Database, MBIE energy prices

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Commercial and residential buildings also use natural gas/LPG for cooking (0.3PJ in residential buildings, 1.8PJ in commercial buildings). Households using natural gas/LPG for cooking are likely to convert to electric elements when electrifying heating to avoid connection charges. Commercial use of gas in cooking can be a hard to electrify use case.

40 An incidental amount of coal (0.6PJ) is also used in space and water heating in commercial and residential buildings., and could be covered by the policy recommendations discussed.

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