NZGBC
TE KAUNIHERA HANGANGA TAUTAIAO

New Zealand's Second Emissions Reduction Plan: Discussion Document Submission

August 2024

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Thank you for the opportunity to make a submission on the draft of the Second Emissions Reduction Plan.

The New Zealand Green Building Council (NZGBC) is a 700-member organisation comprising property owners, construction firms, architects, contractors, suppliers, banks, and research institutions focused on improving the environmental sustainability of buildings and construction. We represent the construction and property industry's expertise on sustainability and, in collaboration with industry experts, design and operate the leading Green Star and Homestar certifications that are the benchmarks for the environmental sustainability of buildings in New Zealand. We also run the NABERSNZ energy efficiency system on behalf of central Government.

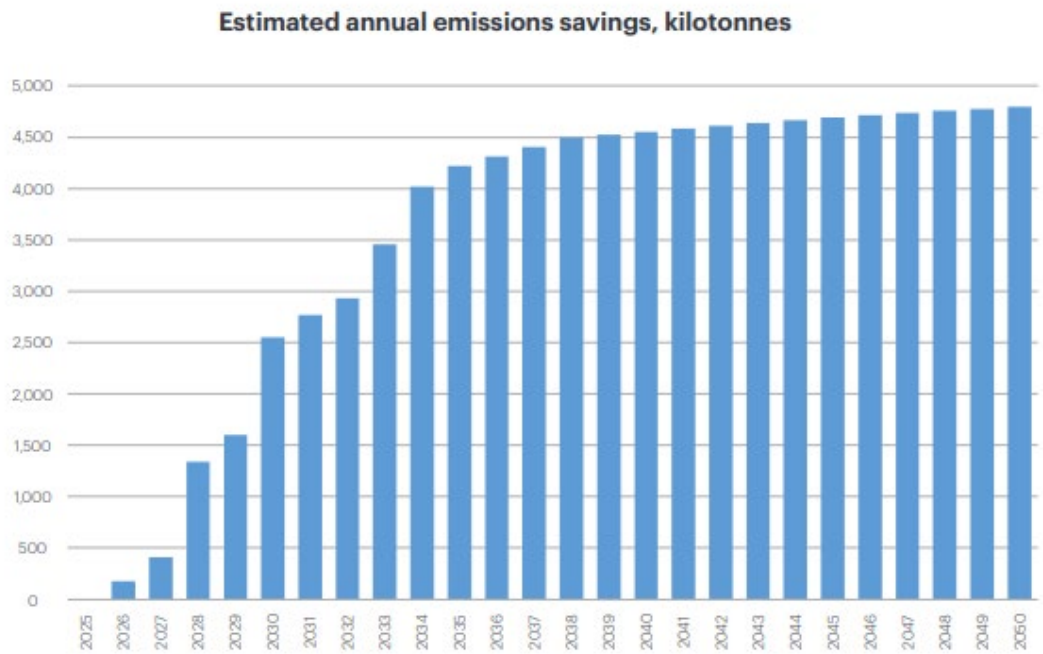
Summary

The draft of the Second Emissions Reduction Plan as it currently stands is an expensive and highly risky strategy. We are putting our children's future at risk by taking such a pollution-filled pathway to achieve our targets.

Under this draft of the Second Emissions Reduction Plan, New Zealand barely achieves the 2026-2030 target. Many events could easily scupper these plans, making it difficult to achieve our target. The draft ERP2 relies on unproven technologies for millions of tonnes of emissions reductions. Given the importance of climate performance for our reputation, costs to the country, and impacts on trade, New Zealand should have a greater buffer.

We are concerned at the lack of a built environment chapter in the draft of the Second Emissions Reduction Plan. Through both embodied emissions in construction materials and building, combined with operational emissions from heating, lighting, and other activities, the built environment contributes 20% of New Zealand's emissions.

Fortunately, there are low-cost policies available to dramatically reduce emissions from our sector, delivering millions of tonnes of savings and enabling New Zealand to get back on track to achieve its emissions targets, reduce ongoing costs for families and Kiwi businesses. Many of these recommendations and polices in this submission have been laid out in our recent report '*Closing the gap: Hidden emissions and untapped potential of buildings to reduce costs and deliver for carbon budgets'*. That report found introducing policies to improve building standards, phase out gas, and make energy use transparent could save 93,000kt of emissions by 2050.



Source: Closing the gap: Hidden emissions and untapped potential of buildings to reduce costs and deliver for carbon budgets

The practical steps include:

- Improving the Building Code to deliver substantially less carbon emissions by 2030 for both homes and commercial buildings. 2,700kt of emissions avoided by 2030 and 42,000kt by 2050. No direct fiscal cost to the Government.

- Phasing out fossil gas in homes and commercial buildings. 2,400kt of emissions avoided by 2030 and 40,000kt by 2050. An estimated cost of $75m a year to the Government.

- Energy labelling of commercial buildings and homes. 920kt of emissions avoided by 2030 and 11,000kt by 2050. No direct fiscal cost to the Government.

In total, these policies, if introduced from 2025, will reduce cumulative emissions by 6,100kt by 2030. That would reduce the risk of failing to reach Emissions Budget Two, and would support work to improve health, reduce running costs for Kiwis, and be part of the solution to New Zealand's energy crisis.

Contents

1. Recommendations

There are numerous low-cost policies that will support our industry to rapidly decarbonise, improve efficiency, and support New Zealand families to cut costs and emissions.

To summarise, here are our recommendations for the Second Emissions Reduction Plan:

- *Evaluate climate policies to assess whether they actually represent value on a whole-of-country basis, not just what is cheapest for the government.*
- *Do not let 'least-cost' become an excuse to do nothing or spend time dithering over options.*
- *Do not rely on carbon capture, utilization and storage (CCUS) as a way to continue fossil fuel emissions*
- *Do not assume any new CCUS emission offsets in the ERP modelling*
- *Do not facilitate CCUS that results in greater fossil fuel extraction*
- *Commit to not providing any subsidies for CCUS*
- *View buildings as major energy consumers and an opportunity to make negative cost energy savings that will enable the decarbonisation of other sectors*
- *Phase improvements to the Building Code to reduce emissions from residential and commercial buildings*
- *Do not revoke the 2023 H1 Building Code upgrades*
- *Improve the Building Code and incremental improvements to a Nearly Zero Energy/Emissions Standard*
- *Expand the Warmer Kiwi Homes programme for insulation*
- *Begin a deep retrofit programme to bring existing homes to Near Zero Energy/Emissions Standard*
- *Require all homes put up for sale or rent to have an EPC by 2028*
- *Require all office buildings over 1,000sqm put up for sale or lease to have a NABERSNZ certificate*
- *Government departments continue to lead by certifying to 5 Star Green Star when it builds buildings worth over $9m.*
- *Join the Declaration de Chaillot - a global initiative to collaborate on mitigation and adapting our buildings and homes for climate change.*
- *We understand the ERP modeling currently assumes that sufficient fossil gas will be produced to meet demand. Correct this modeling to align with MBIE's production forecasts from current fields.*

- *Expand the Warmer Kiwi Homes programme to subsidise electrification of home heating and cooking from 2027, converting 25,000 homes a year.*
- *End new residential fossil gas connections from 2026.*
- *A concerted programme, building on the successful replacement of coal boilers in schools and hospitals, to subsidise 10% of commercial buildings per year from 2026 to electrify space and water heating*
- *Incentivise improved home insulation and home solar generation*

2. This Emissions Reduction Plan is not a least cost option

The less we do now, the more greenhouse gases will continue to accumulate in the atmosphere. Inaction now will increase costs for future governments and New Zealanders over the next five, ten, or twenty years – especially as we factor in the cascading effects precipitated by tipping points and feedback loops.

These economic, social, and environmental costs will be real, with businesses and families missing out on the benefits of going low carbon if we don't act. This draft ERP is following a high-cost approach not a least-cost option.

In setting out a pathway that does not reduce emissions significantly and increases gross emissions, this plan delivers the following four forms of costs (and there will be more):

Firstly, this plan is increasing the gaping chasm between our projected emissions reductions and our nationally determined contributions under the Paris Agreement. When the time to pay our 'climate bill' rolls around in 2030, we will have a huge liability on our hands. Cost estimates for the previously projected shortfall range between $3.3 billion and $23.7 billion, depending on the cost of carbon at the time of purchase. The longer New Zealand leaves negotiations to buy credits, the higher the prices will become, as other countries also join the scramble for a limited pool of credits associated with authenticated climate-reducing projects. The deadline is not far away, and it's a big bill to pay.

Secondly, there is a very real potential that the approach in the draft ERP2 will jeopardise our free trade agreements, including with the EU under which a failure to meet our Paris Agreement obligations could lead to trade sanctions. This is especially concerning for our biggest emitting sector- agriculture. Foreign farmers will not hesitate to use any lever they can to increase trade barriers for New Zealand exports. This raises significant risks for a large part of our GDP earnings.

Thirdly, we only have a limited timeframe to reduce our total carbon emissions. This plan stops government action on reducing gross emissions through actions like encouraging active transport or reducing pollution from the construction and property sector. When we delay emissions reductions like that for two emissions budgets, as this plan sets out, those emissions

do not go away, but increase as our population grows. Failing to act means any future government will face far higher costs to reduce these emissions.

Fourthly, but possibly most critically in terms of our economy's long-term viability, the approach represents a huge missed opportunity to reduce running costs for Kiwi businesses and homes. Equivalent plans to reduce emissions in the US, UK, and most of Europe have been used to improve health and well-being through funding actions such as retrofitting homes or providing more public transport. Each time we miss this opportunity Kiwi families miss out on the additional benefits like health and lower living costs.

The discussion document makes a "least-cost" approach to emissions reductions central to the government's approach. The efficacy of this approach can be questioned and dithering over least-cost paths wastes time. However, given that it is the Government's preferred approach, it is important to understand that merely relying on the Emissions Trading Scheme (ETS) price signal will often not generate the lowest-cost path.

The Emissions Trading Scheme

The price signal from the ETS is weak and faltering as an oversupply of credits undermines the market. The Climate Change Commission estimates that for every $10 on the carbon price, the cost to a middle-income household is $1.18 per week (0.07% of their disposable income). For a household using 5,000kWh of natural gas a year, doubling the carbon price from $50t to $100t would only cost $55 a year, according to Ministry for the Environment figures. Spread out over monthly bills, that cost is too small to impact behaviour and drive investment in measures such as installing insulation or replacing gas heating with electricity. The government would have to adopt the recommendations from the Climate Change Commission to sharply tighten carbon credit supply and push the unit price towards $200t before it would have any significant effect in encouraging capital investments that enable decarbonisation. That would not be a least-cost approach. Hard to abate emitters would be forced to wear very high costs while still not being able to reduce emissions short of closing operations. Low-income families with fossil-fuelled vehicles would have to pay vastly higher petrol costs while not having active or public transport alternatives, or being able to afford an EV.

The Government shows no sign of moving to a carbon price that would actually drive emissions down enough to meet the climate goals, with the ERP failing to lay a path to a carbon price that will drive these kind of capital investments.

'Leave it to the ETS' seems more like a fig-leaf for doing nothing. Foregoing active intervention policies in favour of leaving it to the ETS means New Zealand is likely to miss the true least-cost path which necessitates additional capital expenditure while delivering lower operational costs over time. The price signal from the ETS is too small to impact households' capital investment decisions when it comes to things like space heating or light transport.

There are other reasons the ETS does not work for some sectors:

- It doesn't send a signal for construction products – any impact on cost is so marginal as to not provide any impact, and trade exposed industries get free industrial allocations, so the costs are not passed on to them anyway.
- The ETS allows banking of units and there are too many units already in circulation. That means it is hard to know if the ETS will be effective in driving change.
- Many providers of construction materials in New Zealand receive industrial allocations. They are not impacted by the ETS price.

The Intergovernmental Panel on Climate Change, International Energy Agency, and many others, recommend a combined approach of regulatory and policy drivers along with an ETS.

Usefully the construction and property sector can deliver significant reductions cost effectively.

Policy Recommendations

- Evaluate climate policies to assess whether they actually represent value on a whole-of-country basis, not just what is cheapest for the government.
- Do not let 'least-cost' become an excuse to do nothing or spend time dithering over options.
- Reduce risk by creating a buffer against emissions budget two. Aim to achieve 290m tonnes.
- Depending on carbon capture will not get us there

The discussion document bets heavily on carbon capture, utilisation, and storage (CCUS) with a total of 4.6 megatonnes to be removed by 2035. This is an ambitious number for a highly speculative policy. It is very hard to see how this is possible.

The approach of relying on CCUS to enable gross emissions to continue goes directly against the advice of the International Energy Agency

> *"First and foremost, CCUS should not be used as an excuse to keep emitting," says Mathilde Fajardy, an energy analyst at the IEA. "Reducing fossil fuel consumption needs to be a priority and CCUS can help where it is too expensive or technically challenging to do so."*

The assumed CCUS is from three sources:

1) Geothermal CO2 reinjection. This is helpful and should happen.

2) Reinjection of stripped CO2 in gas production. This may well be possible at low ETS prices, but that actually increases emissions overall (as more gas is produced than

otherwise as noted in this MBIE report https://www.mbie.govt.nz/dmsdocument/28611-proposals-for-a-regulatory-regime-for-carbon-capture-utilisation-and-storage). More fossil gas is ultimately burned than would be otherwise. It is not clear that the ERP2 modelling has accounted for the fact that reinjection would result in greater fossil gas emissions, defraying some of the emission reductions from CCUS. It is quite alarming that draft ERP2 does not make clear that this strategy increases pollution. This should be made transparent in the ERP2.

3) The majority of the reductions assumed by the government in petrochemicals and cement appear to require higher ETS prices, and therefore appear inconsistent with the government's vision of a net-only forestry dominated ETS. This is an unrealistic assumption, irrespective of whether it would even deliver as foreseen.

Much of the CCUS proposals are far less certain. Whereas reinjection creates an economic benefit for oil and gas drillers by giving them access to more fossil fuels to sell, other use cases rely solely on the carbon price itself making the investment economic. CCUS projects underway overseas rely heavily on government subsidies because the cost per tonne captured is well above carbon prices. Unless the government is prepared to enforce a significantly higher carbon price or introduce subsidies, and there is certainty of those settings persisting, emitters will not voluntarily make the very large investments needed in CCUS.

We fear that lack of CCUS investment will drive the government to introduce subsidies for its favoured climate strategy. This would not be a 'least-cost' path. It would be wildly expensive relative to the emissions reductions that could be subsidised instead - for example, building retrofits that have a negative lifetime cost but are impeded by their upfront capital outlay.

Then there is the question of storage. Where would New Zealand put all these megatonnes of CO2? What would be the cost of reinjection into exhausted fossil fuel reserves if there was no additional extraction? How would leakage be prevented? Utilisation ideas such as using emitted CO2 in industrial processes rather than CO2 created specifically for purpose from fossil fuels, and e-fuels, creating hydrocarbons using emitted CO2, only reduce emissions overall if the fossil fuels they replace stay in the ground.

Ultimately, carbon capture, like carbon forestry, runs into the problem that there are finite places where this approach can be used to lock away carbon. While sequestration has potential to offset some gross emissions for a while, once those opportunities for sequestration are used up net emissions will rise once more, because gross emissions have not been eliminated. If CCUS only reduces net emissions temporarily or, worse, enables greater gross emissions, it is not creating a real environmental benefit, and is actually consuming resources better used in reducing gross emissions.

Policy recommendations

- Do not rely on CCUS sequestration as a way to continue fossil fuel emissions
- Do not assume any new CCUS emission offsets in the ERP modelling
- Do not facilitate CCUS that results in greater fossil fuel extraction
- Commit to not providing any subsidies for CCUS

3. The Emissions Reduction Plan must include buildings and construction

Upon launching the draft second Emissions Reduction Plan the Minister for Climate Change stated repeatedly that all sectors of our economy will need to take action to deliver carbon reductions. The New Zealand Green Building Council agrees. The buildings and construction sector is able to help deliver significant reductions, helping to provider a greater buffer in achieving the Emissions Budget Two.

However, the current draft ERP overlooks the role building and construction policies can play in reducing emissions, both through reducing 'embodied carbon' - emissions generated in the manufacture of construction materials, and 'operational carbon' - emissions resulting from the use of a home or other building.

It is a missed opportunity. Not only is building and construction a major driver of emissions, ignoring the sector means the government's goal of 'least-cost emissions reduction' cannot be achieved. Indeed, the largest negative-cost emissions savings are in the building and construction sector, but they will not be realised without good government policy.

The built environment accounts for approximately 20% of New Zealand's emissions, when emissions resulting from building materials are counted. Analysis by Professor Sarah McLaren et al from Massey University shows that on current policies, the building stock's climate impact (170 MtCO2eq) will exceed its climate target (47 MtCO2eq) by a factor of 3.6. Crucially, it should be noted that the biggest source of emissions is operational energy use from existing buildings.

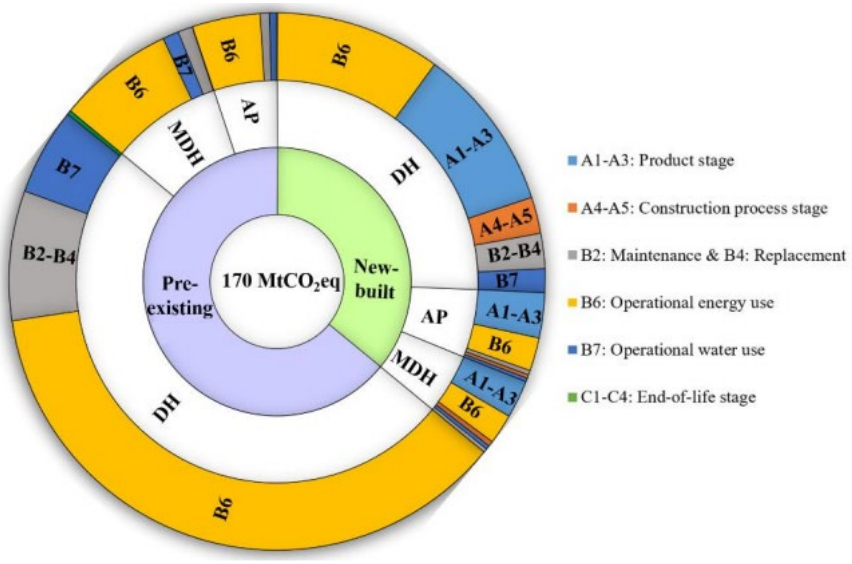


Figure 2. Carbon footprint of total building stock of New Zealand residential buildings up to the year 2050.

Source: [Application of Absolute Sustainability Assessment to New Zealand Residential Dwellings, S J McLaren et al]

Accelerating the decarbonisation of this sector can get New Zealand back on track to achieve its emissions budgets and reach net zero by 2050, as well as reducing how much the government will have to spend on overseas carbon credits to meet our Nationally Determined Contribution under the Paris Agreement.

There are mature technologies available to reduce emissions from the operations of buildings and opportunities to reduce embodied carbon (counted as industrial emissions) through new low-carbon manufacture technologies, reducing waste of these materials, and by replacing high-carbon materials with low-carbon materials. Many opportunities for reducing emissions in the built environment can be implemented relatively quickly to help take the pressure off industries that will take a bit longer and/or cost more to implement.

Investing in energy efficiency would cut household bills, most notably amongst those struggling to adequately heat their homes in winter, reduce business operating costs, and provide thousands of local jobs in every area of the country with homes and buildings. By reducing the cost to families of maintaining a healthy temperature in their homes, these policies would improve health, reduce costs to the health system, and improve productivity.

Additionally, more energy efficient buildings can enable decarbonisation of transport and industry. Buildings are major consumers of electricity for space heating. While electricity

consumption itself is relatively low in emissions due to New Zealand's high level of renewable generation, reducing electricity waste in buildings will free up electricity to be used by the transport sector as the fleet electrifies. Improving energy efficiency in buildings, therefore, enables the reduction in transport emissions without the cost of new generation.

Including the buildings and construction sector will significantly derisk the ERP. At present there is a reliance on very high levels of planting, which will be challenging to achieve and much of the emissions savings from CCUS are unfunded and highly speculative. Buildings and construction are able to reduce emissions significantly with proven technology which is available today. All that is needed is some simple no cost policy initiatives. This will help reduce the risk of NZ meeting the emissions budget two which is currently only achieved by a less than 1% (303 megatonnes vs a target of 305 megatonnes).

Improving the energy efficiency of buildings and homes will also reduce energy use helping to solve New Zealand's energy crisis.

Policy Recommendations

- View buildings as major energy consumers and an opportunity to make negative cost energy savings that will enable the decarbonisation of other sectors

4. Measure and reduce embodied carbon in construction

The ETS alone has a relatively low impact on building practices. Decisions on building materials, design, and typology are made by developers while the costs are borne by the purchasers of the new homes and buildings. Costs arising from the ETS at the point of manufacture of materials like concrete are likely to be a small portion of the build cost of a home or other building that is not necessarily readily apparent to builders, and a low priority for builders to minimise. Furthermore, low emissions construction can add to the cost of construction and mean adopting new materials and practices that the often conservative building industry is slow to adopt.

Building practice tends to treat the Building Code as the standard, not as a bare minimum. Extensive experience has shown that improving the Building Code is the best way to drive change in how buildings are constructed.

The Building Code can be modernised to require both low embodied emissions and low operational emissions. MBIE's Building for Climate Change programme envisages moving towards a near zero emissions standard for new homes in three steps.

In the European Union, building to a near zero energy standard has been mandatory since 2021, with a proposal now being discussed to enhance this to a near zero emissions standard

by 2030. The NZGBC's Homestar system already lays out the requirements for homes to achieve these outcomes in New Zealand.

Embodied emissions per square metre in new buildings and homes can be reduced through use of low-carbon materials, smart design, and waste reduction and recycling.

Hundreds of buildings are already measuring and reducing carbon emissions through the use of green building rating tools. Tens of thousands of homes are doing the same.

To help inform buyers, an estimate of the lifecycle emissions of new buildings should be required as part of a building consent from 2025. This is not a novel approach globally. The EU, the UK and Australia, have all had similar requirements for some time, in the case of the EU for decades. This is the key first step this government could take and the sector is supportive. It would help provide useful data and benchmarking for the sector. It would also encourage designers to consider elements that can improve the health and energy efficiency of buildings such as reducing overheating risks, a significant issue for new build homes.

With stepped reduction from 2028, by 2030 over 1,400kt of emissions would be avoided from new residential housing compared to business as usual. This would rise to 22,000kt by 2050.

It will also help improve comfort. The current building code does not require designers to calculate the risks of the building or home overheating. The NZGBC is receiving frequent reports of homes overheating. Terraced homes and apartments have reduced opportunities for cross ventilation. With temperatures rising and terraced homes and apartments making up more homes, more families will likely face very uncomfortable temperatures.

The 2019 report *The carbon footprint of New Zealand's built environment: Hotspot or not?* by thinkstep-anz estimates upfront carbon emissions from non-residential construction are 1,600kt per annum. While not all non-residential construction is amenable to readily available low-carbon alternatives in the short-term (supply of low-carbon concrete and steel is still low), reductions of 20% from 2028 and 40% from 2030 are practical, saving 1,300kt by 2030, growing to 20,000kt by 2050.

Tightening the embodied carbon requirements for buildings over time will drive investment in low-carbon construction materials. Already, many sectors are making significant strides to reduce emissions. New Zealand's concrete industry has set a pathway to 44% less embodied carbon from concrete by 2030. The electric arc furnace, due in two years, will ensure a good proportion, around 40%, of New Zealand's steel is recycled steel. Growing demand for low carbon building will drive expansion in wood building and may help to drive innovations such as green steel.

That policy would not carry a direct fiscal cost for the Government. There is no reason New Zealand could not also move to a near zero emissions standard for buildings in the 2030s. Ensuring our buildings and construction sector aligns with the Zero Carbon Act requires the following improvements to the Building Code:

Policy recommendations

- Phased improvements to the building code to reduce emissions from residential and commercial buildings
- 2025 Measuring operational and upfront carbon emissions at consenting stage
- 2028 20% reduction in both upfront and operational emissions in 2028
- 2030 40% reduction in upfront carbon emissions and near zero energy in operation
- 2034 60% reduction in upfront carbon emissions and near zero energy in operation

These targets are in line with World Green Building Council reductions.

5. Boost insulation standards for new builds and invest in retrofits

At COP 28, Minister of Climate Change Simon Watts signed New Zealand up to the Global Renewables and Energy Efficiency Pledge. Among the clauses of this pledge, New Zealand and other countries;

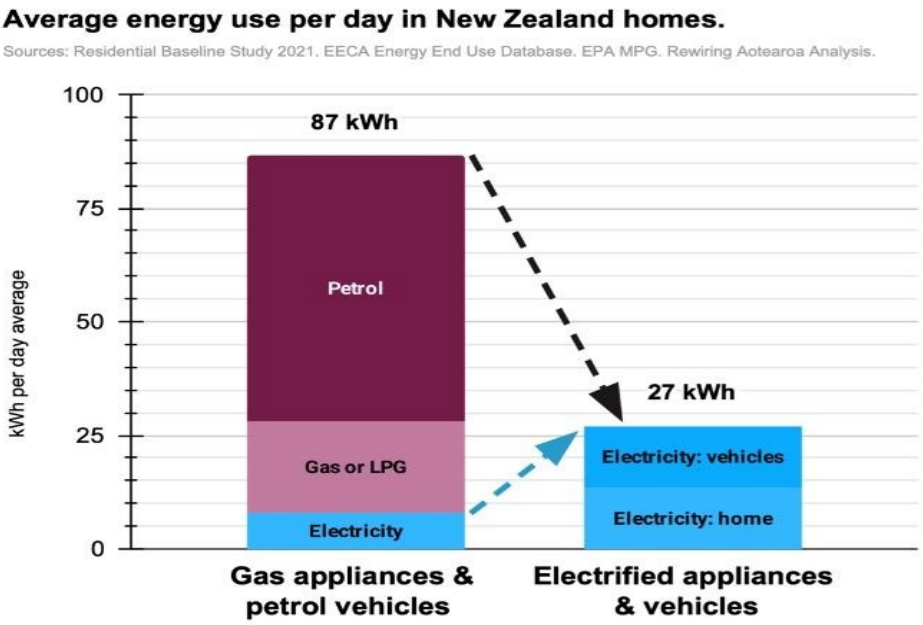
- commit to work together in order to collectively double the global average annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.
- commit to put the principle of energy efficiency as the "first fuel" at the core of policymaking, planning, and major investment decisions.
- commit to take comprehensive domestic actions to contribute to the achievement of this pledge, including by adopting ambitious national policies on renewable energy and energy efficiency and reflecting this ambition in NDCs, working with cities and subnational governments, focusing on the key tools and enablers most relevant to national and local circumstances.

The Government can make good on these commitments by enabling energy efficiency in buildings.

To meet our climate goals, the transport and industrial sectors will need to replace fossil fuels with renewable electricity. While electric vehicles and electrified plants usually have lower running costs than fossil fuels, and that cost is dropping as technology improves, there is

significant capital cost in those machines, as well as the downstream requirement for additional electricity generation and transmission capacity.

For example, an electrified household uses less energy overall because fossil fuels are inefficient, but - without measures to improve the homes' energy efficiency, electricity demand rises significantly.

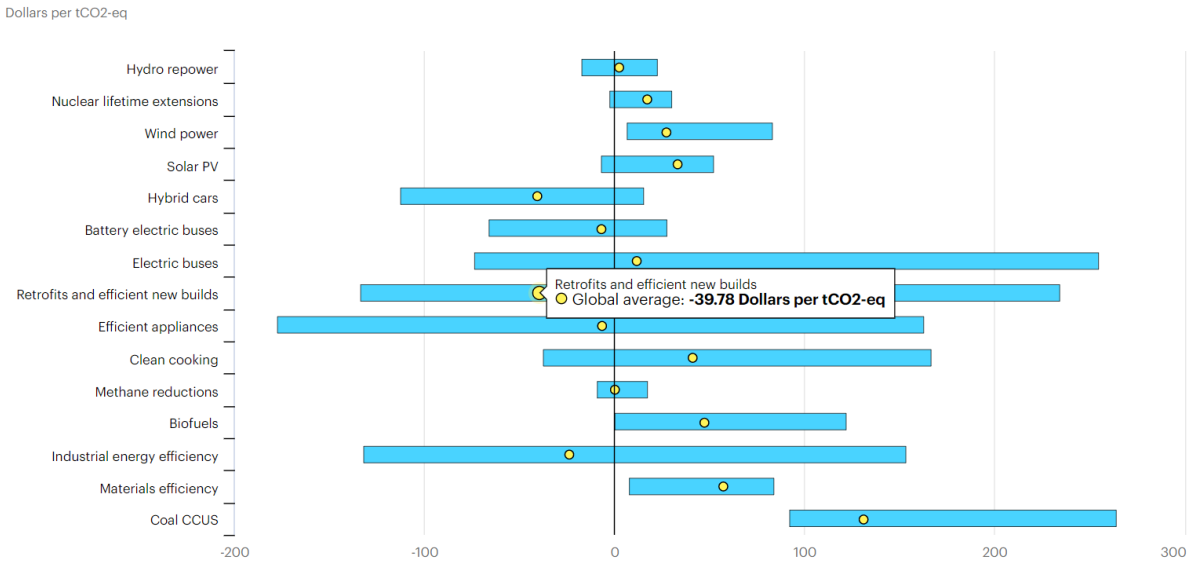


Source: Rewiring Aotearoa

MBIE estimates that electricity demand will rise 81% by 2050, driven by electrification. On the other hand, space heating for household alone represents 5% of New Zealand's energy use, equivalent to 19% of electricity consumption. In short, reducing household and business energy consumption for space heating through better insulation would mean less total demand for electricity, reducing the amount of new investment needed to supply transport and industry.

Daily peak loads on the electricity network are likely to become more extreme due to EV recharging and heating, coinciding with the loss of solar electricity at the end of the day. Because electricity generation and transmission must be built for peak loads, anything that reduces those peaks, reduces costs significantly. More efficient use of energy by buildings would reduce the electricity demand daily peaks. Research by Professor Michael Jack et al shows "rapid uptake of currently achievable best-practice standards could reduce the winter electricity peak by 75 per cent from business as usual by 2050." That would enable the transition to 100% renewable generation at least-cost.

Because greater energy efficiency also means lower power bills for households and businesses, it is one of the cheapest ways to decrease emissions. The International Energy Agency's *Sustainable Recovery* report found retrofitting existing buildings and building more energy efficient new builds is one of the best negative net cost options for reducing emissions.



It would be nonsensical, therefore, for the government to reduce insulation standards as has been discussed recently. Such a move would not only increase operational costs for the owners of new ones, it would increase the cost of electrification for the entire economy. Instead, the government should commit to improving insulation standards for new builds and renovations of existing buildings to bring them up to the Nearly Zero Energy/Emissions Standards that the EU and other jurisdictions are already implementing.

The Building for Climate Change consultation paper in 2020 envisaged a transition from measuring r-values of emissions, to measuring buildings' energy efficiency and emissions moving to an heating/cooling energy efficiency standard for new builds and ratcheting that standard down in three steps by 2035 to 15 kWh/(m2 .a) – a nearly zero energy level similar to what the EU has already mandates. Since then, the update to clause H1 of the Building Code has lifted insulation requirements, but not to the extent the Building for Climate Change programme has laid out.

There are no technical barriers to achieving very high energy efficiency and very low emissions from new building operations. The required technology and building techniques are in wide use overseas and are being taken up in New Zealand.

We usually think of efficiency as an emissions reduction strategy – less energy needed for heating, less embodied carbon, less waste, less water use all lead to reductions in emissions from the built environment. New Zealand should be working to rapidly improve the efficiency

of its building stock anyway – to save households and businesses money, to improve Kiwis' health, and to free up electricity for other sectors.

However, more efficient buildings are also more resilient to the effects of climate change.

A more thermally efficient building is less costly to cool as temperatures rise. A built environment of more thermally efficient buildings means reduced electricity demand spikes during the more frequent winter storms and summer heatwaves that climate change will bring. Buildings that use water more efficiently will create less demand on increasingly stressed water supplies. More energy efficient buildings overall reduce the baseload on the electricity system, making it less vulnerable to weather-induced outages and dry years.

The techniques and technologies to achieve these efficiencies are well-developed and proven. The NZGBC routinely sees homes built at 20-40% less water use per day. That reduction delivers carbon and water savings and helps delay the need for large infrastructure projects to take water from other regions as Auckland is doing.

But the market will not move to these standards on its own. In New Zealand, the Building Code minimums are often seen as the standards. Generally, developers do not build above Building Code requirements. While many developers seek to be able to create a premium product by obtaining Homestar or Green Star certification, developers aiming for the general market know that customers are purchase-cost sensitive, not operational-cost sensitive (which they often have poor information on). This is a similar phenomenon to how customers focus on the sticker price of a car, not its total cost of ownership. This forces developers to seek to minimise build costs, even if that increases the operational costs for users. So, government leadership, by improving the Building Code, is vital to achieving the potential for greater energy efficiency from new buildings.

Deep retrofits

Setting the new build standard higher raises the bar for older homes and makes better insulation products more affordable and readily available - encouraging more retrofits. The government should also back retrofits through an expanded Warmer Kiwi Homes programme and a Deep Retrofit programme.

Deep retrofits involve taking existing homes and improving their thermal envelope (insulation, double-glazing, weathertightness) to a near zero emissions standard, as well as replacing any fossil fuel systems or inefficient electric heating with efficient heat pumps.

Deep retrofit requires investment up-front but generates long-term savings by decreasing the operating emissions and electricity use from housing, as well as extending the useable life of houses.

As the electricity system moves to 100% renewables over time, the emissions savings from reduced electricity use in homes reduce over time. However, the reduced electricity demand

makes it easier for other sectors to electrify with reduced cost. As well as emissions reductions and electricity savings, deep retrofit creates health benefits for families living in the upgraded homes, which flows through to savings in the health sector. European countries are rolling out deep retrofit programmes as part of their decarbonisation efforts.

The Homes We Deserve campaign in New Zealand is proposing a similar programme here, calling for "a fully funded ambitious plan to roll out a pollution-busting home reno programme for at least 200,000 homes within nine years which will:

- Slash carbon emissions and household bills
- Improve the health of thousands of New Zealanders, young and old
- Create tens of thousands of jobs"

The campaign has the backing of 170 organisations.

Deep retrofit is an important component of the long-term adaptation of the building stock to a low-emissions economy.

Policy recommendations

- Do not revoke the 2023 H1 Building Code upgrades
- Improving the Building Code and incremental improve to a Nearly Zero Energy/Emissions Standard
- Expand the Warmer Kiwi Homes programme for insulation
- Begin a deep retrofit programme to bring existing homes to Near Zero Energy/Emissions Standard

6. Introduce Energy Performance Certificate and NABERSNZ requirements

Market preferences for homes and buildings that are cheaper to operate and create less pollution can be a driver of energy efficient, low emissions building options and heating technology. However, these preferences can only be realised if the market has the right information. Energy Performance Certificates (EPC) and NABERSNZ ratings are proven tools for increasing the awareness of buyers, lessees, and renters about the energy efficiency of homes and buildings they are considering. They help markets to function more efficiently.

Energy Performance Certificates are a market-based solution to improving home energy efficiency. Similar to energy efficiency labels for vehicles and appliances, they provide prospective home buyers and renters with information on how well insulated and affordable a home is to heat. Used throughout the OECD, including the UK and EU, EPCs tend to drive the

market towards favouring more energy efficient housing. They encourage homeowners to make upgrades and developers to build to a higher standard so the property is more marketable.

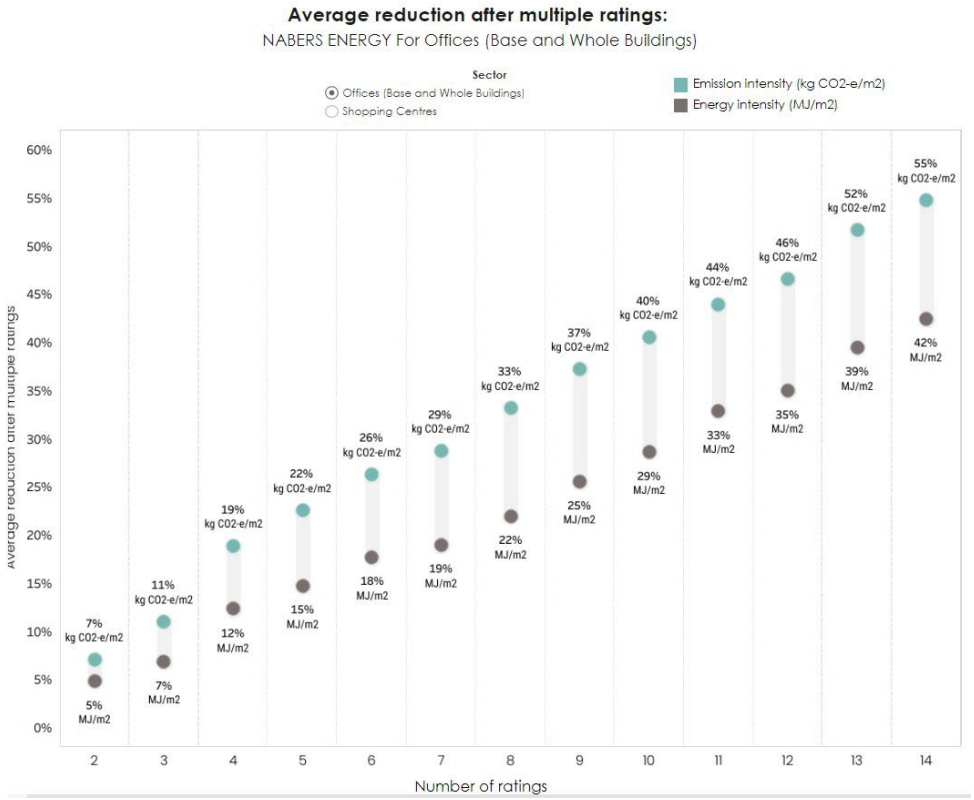
Information drives behaviour change by making potential buyers and renters more aware of the energy costs they will face in a home and more discerning on this point. In turn, this encourages sellers and potential future sellers to take opportunities to upgrade their homes.

In the EU, all homes and larger buildings that are offered for sale or rent must have an EPC and be rated on an A-G scale. Low rating homes are legally barred from being offered for rent. A UK study of EPCs showed that, if dwellings moved from their assessed EPC rating to their potential rating (e.g. a house that rates D being retrofitted to its highest potential rating of B) total dwelling emissions would fall by 47%.

Homestar is a readily available system for rating the environmental performance of new homes. Homestar was developed by the industry, is familiar to many, and is widely used. Homestar can be used as the basis for Energy Performance Certificates applying to both new and existing homes. With better information, buyers and renters will make choices influenced by a home's energy efficiency and emissions. This in turn will encourage the market to supply more efficient, lower emission housing.

All residential homes put up for sale or rent should be required to have an approved EPC, showing how energy efficient they are, and the main drivers of energy use. Overseas experience shows that EPCs drive consumer preferences and enable banks and councils to develop policies that incentivise energy efficiency. We conservatively estimate this would lead to a doubling of the average annual per-house reduction in operational emissions from 1% to 2%, saving 120kt by 2030, rising to 5,300kt by 2050.

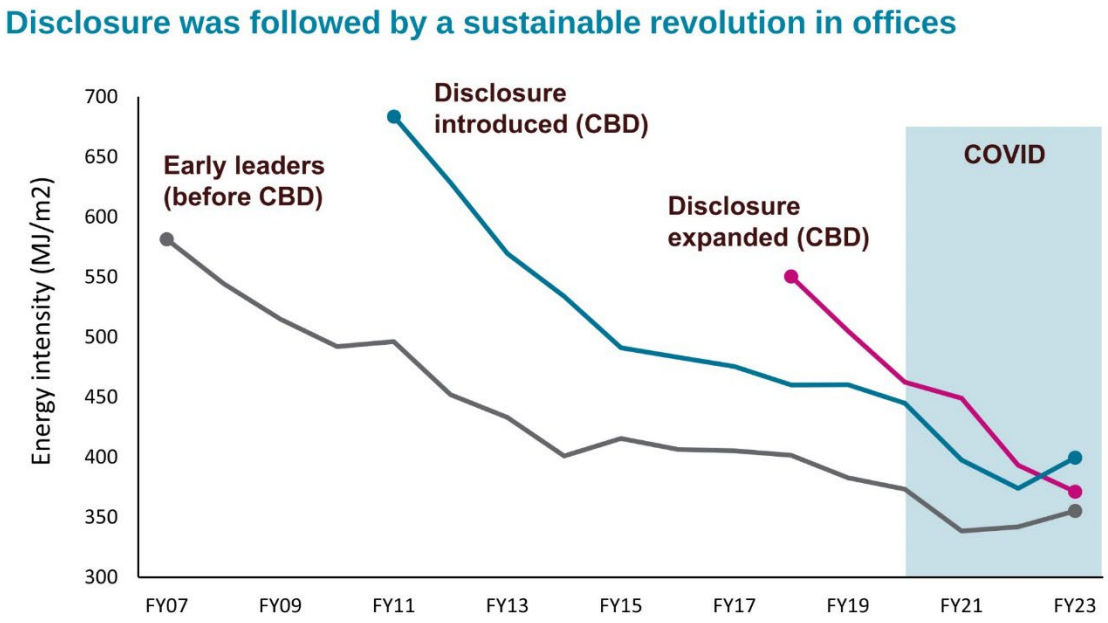
In Australia, commercial buildings over 1,000sqm are required to have a NABERS energy and environmental rating certificate. Since NABERS became mandatory in 2010, average energy used per square metre has reduced over 50%. The following image shows the reductions office buildings achieve on average after each rating. It shows that over time significant savings are made, reducing costs for the businesses in those buildings.



It was the mandatory programme, called the Commercial Buildings Disclosure programme that has driven change. Over the life of the programme, rated buildings have saved AUD$1.7b on their energy bills and 11.7MT of emissions.

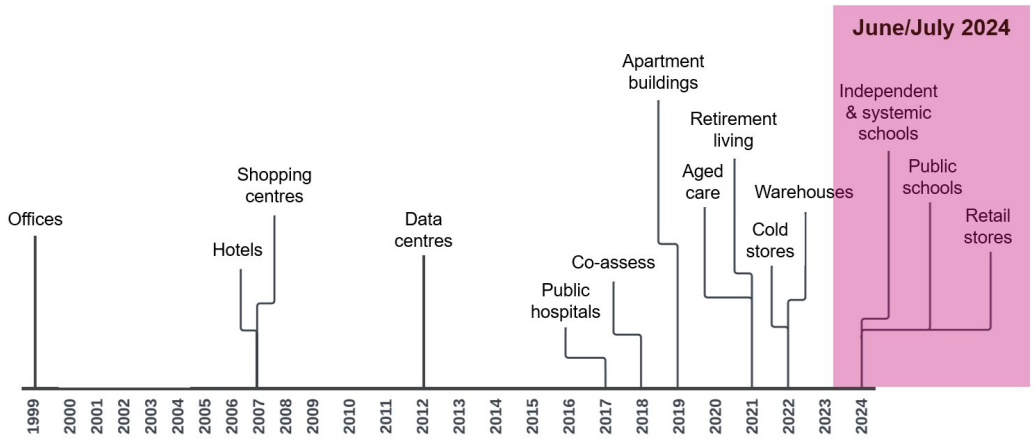
In New Zealand, all government offices above 2,000m² must have a NABERSNZ base build rating by December 2025. A tenancy rating is also required when a building is at, or above, 5,000m². Agencies entering a new lease or renewing an existing lease should achieve a minimum of four stars, while government agencies planning a new build project need to achieve a minimum rating of five stars.

We recommend all office buildings over 1,000sqm should have a NABERSNZ certificate. In Australia, energy intensity of buildings has dropped significantly with NABERS. Similar results would be achieved more quickly in New Zealand with the now-widespread availability of energy-efficient technology.



By 2030, emission savings would be approximately 800kt, growing to 5,300kt by 2050. The Benefit Cost Ratio of an energy performance certificate scheme for office buildings in New Zealand was found to be 1.7. For every one dollar invested one dollar seventy cents would be returned.

Additional building types could be added over time. The following table shows the building typologies that are now available on a voluntary basis in Australia. The Australian federal Government is currently consulting on moving to include a further five building types within the Commercial Buildings Disclosure programme.



These policies would not create direct costs for the government beyond minor administrations costs, which could be recouped. There is strong support from the property sector.

Another important step is for government to continuing to lead by certifying to 5 Star Green Star when it builds buildings worth over $9m. This is current government policy within the Carbon Neutral Government Programme. This policy supports the sector to upskill and learn about building lower carbon, healthier buildings that are more resilient, and should continue.

We also recommend New Zealand join the Declaration de Chaillot, a global initiative to collaborate on mitigation and adapting our buildings and homes for climate change. Over 70 countries have joined in endorsing the declaration. New Zealand can go faster when we learn from others.

Policy recommendations

- Require all homes put up for sale or rent to have an Energy Performance Certificate (EPC) by 2028
- Require all office buildings over 1,000sqm put up for sale or lease to have a NABERSNZ certificate
- Continue to lead through government procurement by certifying to 5 Star Green Star when it builds buildings worth over $9m.
- Join the Declaration de Chaillot, a global initiative to collaborate on mitigation and adapting our buildings and homes for climate change.

7. Phase out use of fossil gas in homes and for space/water heating in other buildings

The idea of relying on fossil gas to aid decarbonisation is a fool's errand. Fossil gas production is in steep, and terminal, decline as reserves run out.

No major new gas field has come online since 2009, and the last discovery of a field that has gone into commercial production was discovered in 2000. 86% of the ultimate recoverable reserves from the known fields have been used.

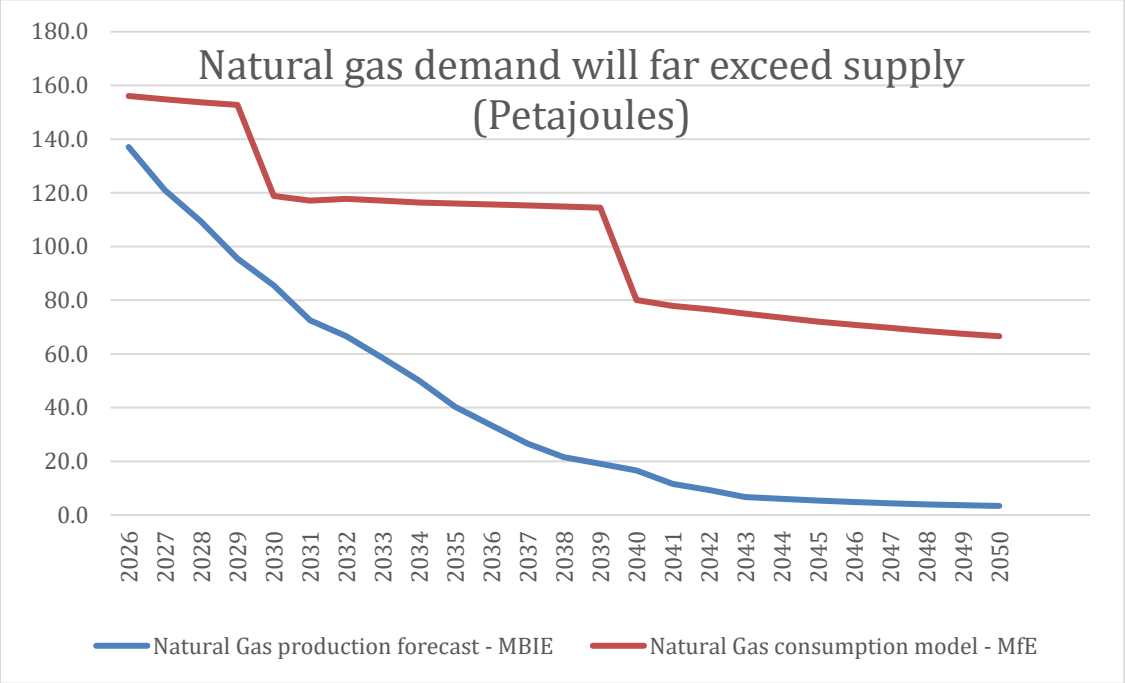
Even before the ban on offshore oil and gas exploration, spending by the sector had dropped to near nothing. Spending on fossil fuel exploration globally has only declined since, because investors can see the world is moving away from fossil fuels and there are more than enough proven reserves already for the transition. Who is going to invest billions in looking for fossil gas, that may not be here, just to supply our small domestic market, with regulatory risk hanging over them? The government has acknowledged it would require large subsidies -

proposed by the Resources Minister in the form of bonds - to attract investment. That is not a least-cost approach.

Even if the government starts issuing new exploration permits, exploration companies choose to come back to New Zealand, and discoveries are made in the next few years, no new production would come online until the early 2030s by which time production will have dropped to half of what it was currently, according to MBIE. If no commercial production eventuates for whatever reason, the decline in production will continue.

Importing fossil gas is not a realistic option. The infrastructure costs would be enormous and would further increase New Zealand's exposure to volatile international energy markets and supply disruptions, while increasing our emissions.

Comparing the demand assumptions in the ERP model with MBIE's forecast production figures shows a large and growing supply gap. Whether or not new fossil gas is eventually brought online, unless demand decreases in a planned way, the next decade will see increasing prices, greater risk of supply disruptions, network under-investment, and, ultimately, consumers needing to be cut off to reduce demand to match supply.



Relying on new fossil gas is a high-risk, high-cost approach. Hope is not a strategy.

Rather than betting on the forlorn hope that gas production will recover, the least-cost approach would be to rapidly remove low-value, easily-replaced natural gas demand, giving some protection to high-value, harder-to-convert use cases. This can be achieved in part by converting dwellings' and other buildings' fossil gas use for space and water heating to electricity instead. That would save around 7-14PJ of fossil gas per year, 10-20% of forecast

production in the third emissions budget period. Ideally, the natural gas saved would remain in the ground, rather than be burned, reducing emissions or, at least, spreading their use further over time.

Operational costs of electric appliances are lower than fossil gas ones. While residential fossil gas is cheaper per GJ than residential electricity, a fossil gas heater only supplies heat by burning, a heat pump is drawing energy from outside the home into it, supplying 3-5 times more energy than is consumed by the heat pump itself. Gas ovens have comparable costs to electric ones once maintenance and their relative inefficiency are accounted for. Gas hot water is only marginally cheaper than electric. Having a gas connection means an additional annual connection fee or bottle delivery cost of several hundred dollars compared to an electricity-only home.

Homes that switch to electricity-only will have lower overall running costs, enabling occupants to keep homes warmer and improve health of the occupants, which flows through to savings in the health sector. That is only going to become truer as the price of fossil gas rises faster than electricity over time, both due to decreasing supply and increasing carbon price, with the price differential per GJ already shrinking over the past decade.

There are no technical barriers to converting space and water heating to electricity. Indeed, electric heating is less costly, more energy efficient, and reduces emissions - and supply will be more reliable as fossil gas production declines. However, the transition away from fossil gas is not a given. Residential consumption of fossil gas is rising. Every year 5,000 new residential connections to the reticulated fossil gas network are made, locking in more future demand that locks in low value emissions.

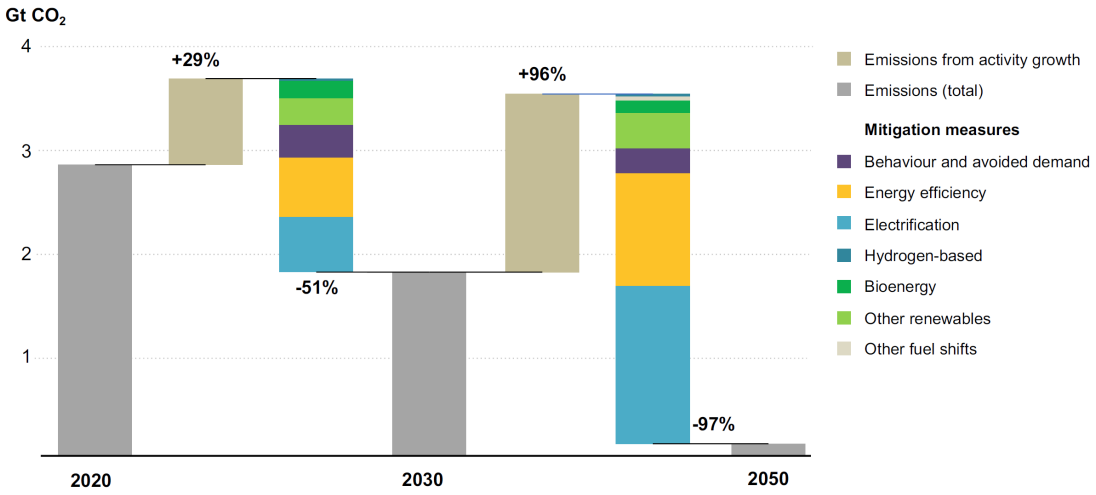
While the electricity required for additional heat pumps carries an emissions cost, it is only about a ninth of the emissions per unit of heating delivered compared to fossil gas, due to heat pumps' high energy efficiency and the low emissions intensity of electricity.

The upfront capital cost is a barrier, despite the savings in operational costs to be made over time. While fossil fuels are subject to the ETS, the price impact is relatively small and often goes unnoticed by consumers. Given the long-time frame for the benefits to be realised against the immediate costs, the price signal from the ETS alone is likely to be insufficient to drive a significant number of retrofits.

This aligns with the recommendations of the International Energy Agency. The IEA recommend a focus on energy efficiency and electrification to drive down emissions in the built environment.

The IEA's roadmap for the built environment

Adapted from Figure 3.27. Global direct CO_2 emissions reductions by mitigation measure in buildings in the Net Zero Economy, IEA 2020



The Government needs to act now to reduce fossil gas demand by:

- banning new residential gas connections
- electrifying commercial and residential space and water heating as quickly as possible
- improving insultation to reduce peak demand when gas electricity generation is at its highest
- massively increasing solar electricity production, both on buildings and at grid-scale.

If it fails to do so, the government will find it politically impossible to cut off heating for businesses and homes as gas demand exceeds supply. Therefore, supply to industry will be cut off instead – if not directly, then through high prices - which will be far more costly in economic terms.

Policy recommendations

- We understand the ERP modelling currently assumes that sufficient fossil gas will be produced to meet demand. Correct this modelling to align with MBIE's production forecasts from current fields.
- Expand the Warmer Kiwi Homes programme to subsidise electrification of home heating and cooking from 2027, converting 25,000 homes a year.
- End new residential fossil gas connections from 2026.
- A concerted programme, building on the successful replacement of coal boilers in schools and hospitals, to subsidise 10% of commercial buildings per year from 2026 to electrify space and water heating
- Incentivise improved home insulation and home solar generation