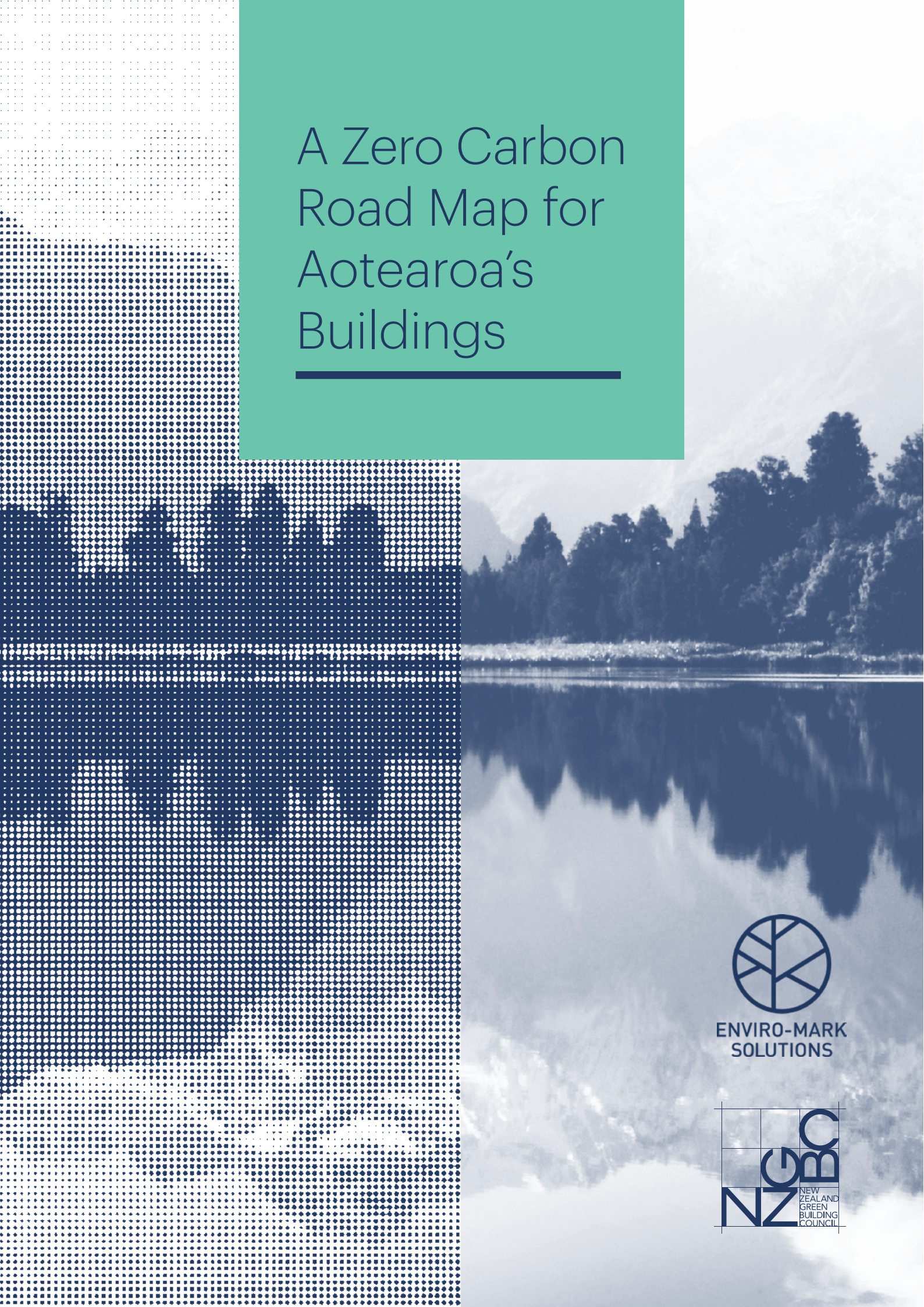
A Zero Carbon Road Map for Aotearoa's Buildings



ENVIRO-MARK SOLUTIONS

NZGBC NEW ZEALAND GREEN BUILDING COUNCIL

Summary

Tackling climate change, and moving to zero carbon, will ensure New Zealanders and our businesses are healthier and happier. Many businesses have already embarked on a journey to zero carbon. Increasingly, consumers are demanding this of businesses and zero carbon legislation will demand this too.

But a zero carbon Aotearoa, and all its benefits that New Zealanders will enjoy, is possible only if all our buildings and homes are zero carbon.

The New Zealand Green Building Council is asking building owners, developers and tenants to indicate their support for this revolutionary shift and signal their commitment to zero carbon in the following ways:

- Building owners to start certifying their existing buildings to zero carbon in 2020 and have all their buildings zero carbon by 2030.
- Building developers to construct their new buildings to zero carbon, and 20% less embodied carbon, by 2025.
- Tenants inform their landlords in 2020 that they will be seeking zero carbon-rated buildings in their leases by 2025.

To ensure zero carbon buildings in Aotearoa, the Government must take these initiatives:

- It must set a 10-year trajectory to ensure new buildings are zero energy under the Building Code by 2030. To achieve this we propose three updates to the Building Code in 2022, 2026 and 2030, including restricting fossil fuel combustion in new buildings by 2026 and eliminating their use in new buildings by 2030.
- It must require energy-efficiency labelling on existing buildings (residential and non-residential of more than 1,000m^2) when they are sold or leased by 2024. Government can also lead with procurement declaring that, from January 2021, NABERSNZ energy-efficiency ratings will be required on the base buildings in leases of buildings of more than 1,000m^2 for government agencies or ministries, rising to require 4 star NABERSNZ from October 2024.
- It must ensure that the Ministry of Health, Ministry of Education, New Zealand Defence Force and Department of Corrections lead an all-of-government shift to verify their new buildings as sustainable and having lower embodied carbon from June 2020.

Foreword

Buildings keep us and our loved ones warm and dry. They provide shelter and sanctuary. They are places where we create lifelong memories and where we create world-leading businesses. We teach our tamariki in buildings and we care for our whānau in buildings.

But our buildings are responsible for significant climate-changing pollution. Emissions from the construction sector have leapt 66% in a decade. The built environment is culpable for approximately 20% of our country's carbon footprint. And constructing and renovating New Zealand buildings pumps out climate-changing pollution equivalent to the emissions from one million cars on the road every year.

Climate change is our greatest challenge. But New Zealand will not achieve the healthier zero carbon future we deserve unless, together, we curtail emissions from the building and construction sector.

Many people, companies and organisations in our sector have already made significant steps up to this challenge. We have travelled the country to talk with and listen to these New Zealanders. Together, we are moving towards a realistic pathway to zero carbon buildings, including an independent verified certification, for the very first time.

This document sets out the ways in which how zero carbon buildings will be defined, measured and verified, and will evolve in New Zealand.

But this zero carbon certification is not a stand-alone tool for achieving zero emissions.

That's why the NZGBC have identified the significant milestones that the government and industry must achieve to decarbonise New Zealand's buildings. These include an improved Building Code, significantly increased transparency around the energy-efficiency of buildings, and a call for key government ministries and departments to lead a revolutionary shift in green buildings.

When all parts of this road map are in place, the building and construction sector will be zero carbon – the greatest achievement ever for our sector in Aotearoa.

Together, right now, we all have a chance to play key roles in this historical, industry-defining accomplishment.

And the first step is simple. All you have to do is measure the carbon footprint of the building in which you work, or which you own or tenant. Any kind of building. Then you'll know how to improve your building and reduce the pollution it creates.

That first important step will ensure our buildings in 2050 are special, healthy, zero carbon places.

IMAGE: DAWID WISNIEWSKI

Acting Now

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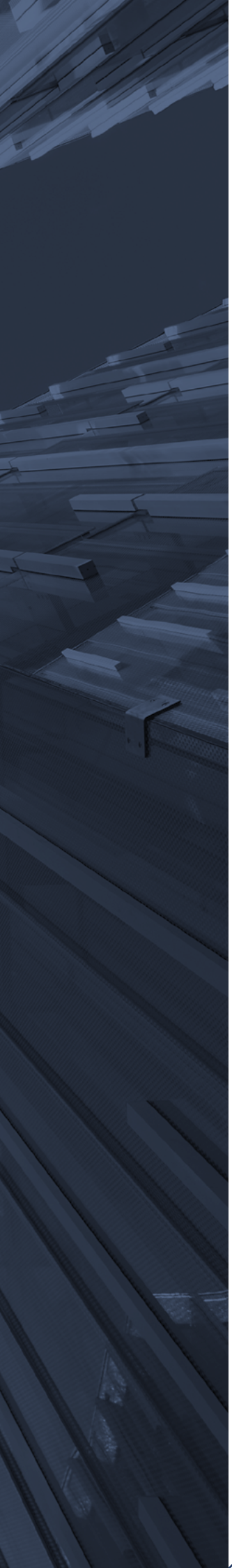
Context

There is a gathering momentum worldwide for countries and organisations to commit to being net zero carbon by 2050, in the wake of the Paris Agreement of 2015. New Zealand, along with 196 other countries, agreed to make ambitious cuts in greenhouse gas emissions, consistent with holding the increase in the global average temperature to well below 2°C above pre-industrial levels. Some countries have agreed to cut their emissions at a faster rate.

The New Zealand Government is in the process of bringing into force the Zero Carbon Act. By late 2019, the Act is expected to empower an independent Climate Change Commission to advise the Government of the day on interim emissions reduction pathways, make progress towards targets and develop regular five-year budgets for emissions.



Climate Change Efforts Building Momentum

There's a surge in green financing schemes, zero carbon legislation is fast approaching, over 100 New Zealand businesses have signed the Climate Leaders Coalition commitment. Science, industry, people and politics are all demanding a better, more sustainable future.

Why are Buildings Important?

Buildings have a significant role to play in bringing about a low carbon economy. A report by Thinkstep[1] shows that the construction and operation of buildings is responsible for around 20% of our domestic emissions (net of emissions from traded goods). About half of this is from the construction of buildings and infrastructure and half from operating buildings. For many New Zealand businesses (including signatories to the Climate Leaders Coalition), a significant proportion of their emissions originate in the buildings that they own or lease.

New Zealand Green Building Council's existing tools, Green Star, Homestar and NABERSNZ, already put a central focus on reducing greenhouse gas emissions but we think the time is right to release certification specifically relating to achieving net zero carbon.

It is in this context that the New Zealand Green Building Council will be releasing a set of tools that allows building owners to measure, manage and offset their emissions on the path to net zero carbon emissions by 2050. The first of these can be found on our website at nzgbc.org.nz

World Green Building Council Advancing Net Zero

The New Zealand Green Building Council (NZGBC) is part of a global net zero carbon project to inspire action from the Green Building Council network towards this transition. This 'Advancing Net Zero' project was initiated by the World Green Building Council with the following goals:

- **100% of buildings must operate at net zero carbon by 2050**

  Existing buildings require an acceleration of current renovation rates but, also, these renovations must be completed to a net zero carbon certification so that all buildings are net zero carbon in operation by 2050.

- **All new buildings must operate at net zero carbon from 2030**

  Net zero carbon buildings must become standard business practice as soon as possible. This means that: we build right from the start; we avoid the need for future major retrofits; and we prevent the lock-in of carbon-emitting systems for decades to come.

NZGBC thinks that these goals are readily applicable and achievable in New Zealand. We intend to galvanise industry towards these goals, through our ratings tools, advocacy (specifically asking Government to legislate) and coordination of industry action.

1. https://www.thinkstep.com/content/hidden-building-pollution-exposed-new-report

What do we Mean by a Net Zero Carbon Building?

The World Green Building Council defines a net zero carbon building as one that is "highly energy efficient with all remaining energy from on-site and/or off-site renewable sources".

NZGBC has taken this definition one stage further. In the case of new buildings, we think the carbon emitted during construction should also be included in the calculations.

We have developed two tools. One is an entry-level tool for building owners wanting to begin the journey, and a second is a more-formal and stricter carboNZero building certification:

- **Net zero carbon building commitment**

  This simple tool enables you to demonstrate and communicate your commitment to a zero carbon building. We want you to disclose your building's energy consumption and carbon emissions and benchmark them against those of other buildings of a similar type. As part of this, we will build a website in early 2020 allowing building owners to post their energy data transparently and compare this against that of their peers.

- **carboNZero building certification**

  This certification programme, being developed in partnership with Enviro-Mark Solutions, will enable you to measure your current carbon emissions more formally, manage your carbon footprint, offset any unavoidable emissions and market your success once you receive your carboNZero building certificate. As noted above, in future, new buildings will have to measure, manage and offset construction emissions in addition to operational emissions if they want to meet the requirement .

New Zealand Green Building Council is asking building
- owners to start certifying their existing buildings to zero carbon in 2020, and to have all their buildings zero carbon by 2030
- developers to build their new buildings to zero carbon, and 20% less embodied carbon by 2025
- tenants to inform their landlords in 2020 that they will be seeking zero carbon rated buildings in their leases by 2025.

What else needs to happen?

A zero carbon building certification won't by itself, bring about all the changes needed to decarbonise New Zealand's built environment. Ratings and certifications are, primarily, a way for building owners to demonstrate their leadership, allowing products and practices to filter down to the industry as a whole.

We expect that the zero carbon certification will stimulate wider discussion in the industry about the issues we face.

Important issues that need addressing:

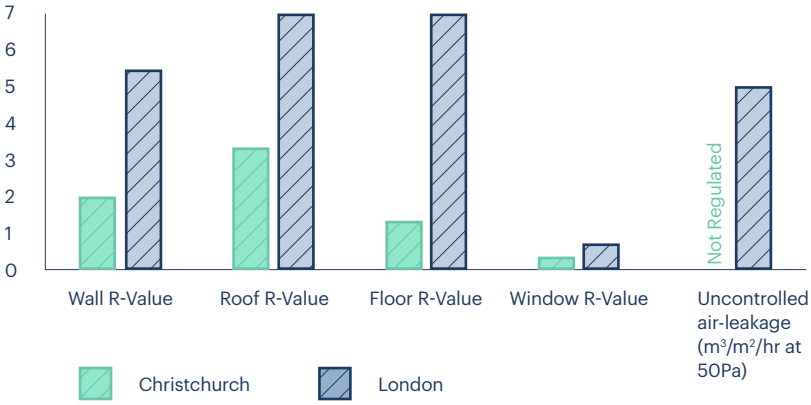
Progressively Tighten the New Zealand Building Code

The New Zealand Building Code is judged to be poor when it comes to its energy-efficiency requirements. The International Energy Agency stated, in its review of New Zealand's energy policy:

"The New Zealand Building Code is below the standards required in most IEA countries with comparable climates."

London and Christchurch have similar heating degree days (a measure of the number and severity of cold days) but required insulation levels and air tightness are at least double and, in the case of floor insulation, five times higher in the UK:

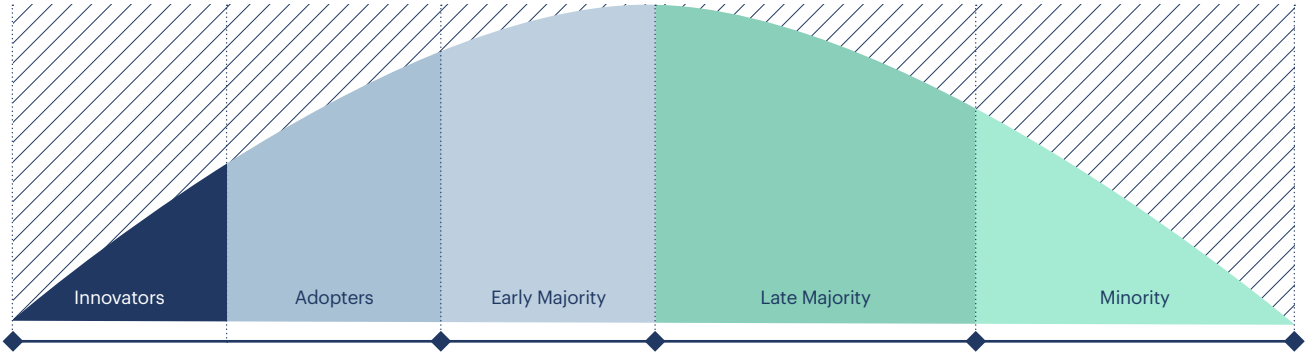
INSULATION AND AIR-TIGHTNESS REQUIREMENTS IN CHRISTCHURCH AND LONDON



This is no accident. In 2006, the UK Government adapted the UK Building Regulations from one based (mostly) on prescriptive energy-efficiency standards to one based on carbon performance. Since then, each successive update (of the equivalent to H1) has required new buildings not to exceed a maximum carbon emissions budget expressed in $kg.CO_2/m^2$. In 2006, Government announced that all new homes would be required to be zero carbon by 2016 and all other new buildings by 2020. The consultation promised that "Planning, the Code and Building Regulations [would] work together to achieve the climate change outcomes".

The 10-year trajectory towards zero carbon buildings was supported by a planned three-yearly cycle of Building Code improvements. Every three to four years, the carbon emission budget for new buildings was reduced by a set amount signalled as part of the 2006 consultation. In this way, industry was given clear guidance on expected performance over a 10-year period and was able to invest in the necessary tools, products and services to make this transition.

STEPS TO MAINSTREAMING HEALTHY BUILDINGS



DIRECT INFLUENCE

Actors are driven to improve the built environment. Green Star, NABERSNZ and Homestar are seen as mechanisms to demonstrate this high level of achievement

INDIRECT INFLUENCE

Ratings are sought or required. Actors are driven to show quality because of government or tenant requirements. Their decisions are infueced by the rating system.

PRACTICAL INFLUENCE

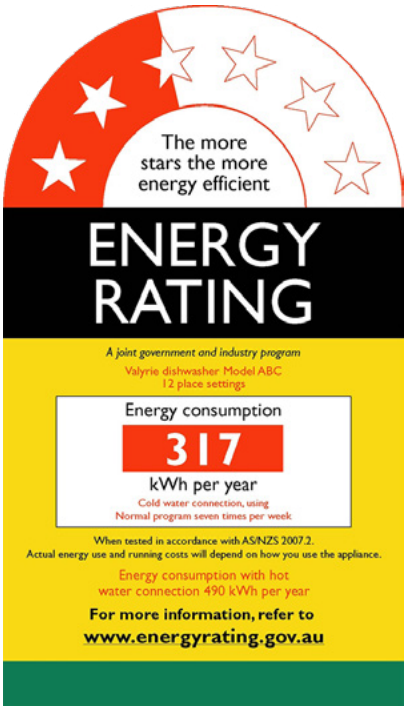
Ratings are not sought but products and practices have filtered down and improved the over all quality of the built environment.

POLICY INFLUENCE

Better building practices help drive policy changes in the regulatory environment. NZGBC relies on advocacy and partnerships to drive policy changes and changes to the Building Code. Green Star, NABERSNZ and Homestar show that changes can be achieved.

To ensure zero carbon buildings in Aotearoa, the Government must set a 10-year trajectory to ensure new buildings are zero energy[2] under the Building Code by 2030. We propose three updates to the Building Code in 2022, 2026 and 2030 to get there.

2. What 'zero energy building' means in New Zealand should be defined by Government, in consultation with industry, by 2022 at the latest. But as a starting point the NZGBC propose that zero energy buildings are broadly those with very low levels of heating and cooling demand, and high-performance heating, hot water and lighting systems. The term zero energy is used here for simplicity, technically this would mean the lowest energy use that is practicable based on the lowest life-cycle cost.



Introduce Building Energy Labels

Prospective purchasers or renters of a building (whether commercial or residential) often find it difficult to ascertain how energy efficient the building is likely to be, either through lack of information or sufficient understanding of what to look for.

A similar problem exists for domestic products and appliances, such as washing machines and dishwashers; this is why New Zealand has mandatory energy labels on these appliances.

The Energy Efficiency and Conservation Authority (EECA) introduced an energy labelling scheme for commercial office buildings in 2013 called NABERSNZ and, following pressure from NZGBC, government is currently drafting policy to require NABERSNZ ratings in new Government leases. In Australia, NABERS is required on the sale or rent of any commercial office building of more than 1,000m^2; this mandatory disclosure has transformed the energy-efficiency of Australian office buildings and NZGBC would like to see the scheme mandated here.

Energy efficiency labels are needed in New Zealand at point of sale and for rentals. In the meantime, NZGBC has developed a standard for older homes called HomeFit (homefit.org.nz) that sets out minimum levels of insulation, space and hot-water heating efficiency, and lighting efficiency.

Argosy – NABERSNZ Ratings

Acting Now

Using building energy labels

IMAGE: JASON MANN

SAATYESH BHANA

Asset Manager at
Argosy Property Ltd

As Argosy is one of New Zealand's leading listed property companies, our strategy is to create a sustainable business, manage the business to deliver financial, environmental and social value to all of our stakeholders, and own a range of high-quality green assets for the future.

FAR LEFT BOTTOM, AND TWO IMAGES ABOVE: 15 Stout Street

FAR LEFT TOP AND TOP RIGHT: Te Puni Kōkiri, 143 Lambton Quay

As an owner and manager of property, we are acutely aware of the impact property can have on the environment and we believe our role is to mitigate it. In 2014, Argosy delivered Wellington's first 5 Green Star Built rating office building which was a refurbishment of an existing building. Since then we have been proud to deliver a further three 5 star Green Star rated buildings with more on the way. We learnt a lot from delivering these projects and stress the cost advantages of targeting a rating from an early concept stage.

Currently, we are working towards obtaining NABERSNZ rating on all our commercial office buildings by 2022 as part of our goal of collecting energy use data for all of our buildings. This process has been challenging as many of our existing buildings did not have suitable metering in place and required retrofitting. NABERSNZ helps us compare the energy use of our buildings and set benchmarks for improvements; however, we're still working on how we can best fairly compare our newer energy-efficient buildings that also have EVs and end-of-trip facilities.

As a business, we have an Environmental, Social and Governance (ESG) Framework, which drives our investment both to preserve and to create value.

This year, Argosy introduced Green Bonds. To be funded by a Green Bond, an asset must satisfy criteria demonstrating that it promotes the transition to a sustainable future. Investment in Green Assets plays a key role in our company strategy.

We see the value in rating tools to verify Green Assets in design and built form and help businesses define benchmarks and set targets. Argosy advocates for simple verification tools which make sustainable development easy to understand for everyone.

Over the coming years, as an industry, we will need to think carefully about the pros and cons of retaining existing buildings and services rather than replacing them with new and more-efficient alternatives, as every case is unique. Embodied energy has a significant relative impact in New Zealand, considering our largely renewable grid. We also need to think carefully about the flow-on effects of infrastructure from electrification.

The journey ahead for the industry to decarbonise our built environment is going to be disruptive and full of challenges and education. What we have already learnt is that measurement and verification are key to success.

To ensure zero carbon buildings in Aotearoa, the Government must require energy-efficiency labelling on existing buildings (residential and non-residential of more than 1,000m^2) when they are sold or leased by 2024.

Government can also lead with procurement declaring that, from January 2021, NABERSNZ energy-efficiency ratings will be required on the base buildings in leases of buildings of more than 1,000m^2 for government agencies or ministries, rising to require 4 star NABERSNZ from October 2024.

Remove Fossil Fuels from Buildings

New Zealand is blessed with an electricity grid that is low carbon by international standards; it is projected to decarbonise further over the next 30 years. This means that wholly electric buildings will reduce their carbon footprints over time.

In contrast, many buildings in New Zealand still have fossil fuel boilers for space and hot-water heating that cannot be decarbonised in this way. Commercial buildings are often heated with gas boilers in the North Island and a proportion of homes typically have instantaneous gas heating for hot water. In the South Island, there are still many buildings (often public buildings, such as schools and hospitals) that are heated with coal.

Around a third of the operational carbon emissions from New Zealand's buildings come from fossil fuels used for space and hot water heating. The majority of these emissions come from natural gas and LPG, both of which have seen steady rises in consumption in recent years. Coal use in buildings is on the decline. Overall, fossil fuel emissions in buildings are roughly equally split between homes and businesses.

If New Zealand is to achieve its net zero ambitions by 2050, these fossil fuel boilers will need to be replaced with low or zero carbon heat sources, such as heat pumps, wood stoves and wood-fired boilers. The technologies to do this are readily available in most cases (see Samson Corporation Acting Now on p. 14) and doing so would save more than one million tonnes of CO_2 equivalent a year. This is nearly 3% of New Zealand's carbon dioxide emissions.

To have their buildings certified as carboNZero buildings, owners will need to have plans in place to phase out fossil fuel boilers, together with other fossil fuel combustion, such as in kitchens and generators, in their buildings by 2025.

Reduce Carbon Emissions from Construction

According to a report by Thinkstep in 2018, the construction and operation of buildings and infrastructure is responsible for around 20% of New Zealand's domestic emissions (net of emissions from traded goods). About half of this is from the construction of buildings and infrastructure and half is from direct emissions that result from the operation of buildings.

Building Life Cycle Assessment (LCA) calculates a building's environmental impact over its lifespan, including the manufacturing of building materials, operations, maintenance and end-of-life.

BRANZ research shows that, in a typical office building, embodied emissions (of the envelope and structural materials only) account for 28% of the building's 60-year life cycle of global warming potential. As we decrease the impact of a building's operations through energy-efficiency, the relative impact of materials increases.

A building's embodied emissions are emitted in the first year or so of construction so we need to think carefully not only about a building's operational impact but, critically, about what we construct over the next decade as we race to move past peak emissions and limit global warming to 1.5°C. A high embodied emissions building boom would not be in the best interest of the planet.

We still need buildings so how can we reduce emissions in construction?

EPD Australasia is an independent framework for publishing science-based environmental information in the form of Environmental Product Declarations (EPDs) in accordance with international standards. Building materials are measured using a range of indicators, one of which is Global Warming Potential; this is measured in units of carbon dioxide equivalent (CO_2e). There are still not many EPDs in New Zealand.

New Zealand manufacturers can help by measuring and sharing the emissions associated with their specific products by publishing EPDs. Fortunately, common building material types in New Zealand are well understood and information about them is published by BRANZ.

The selection and quantity of materials is what determines the embodied emissions of a building so designers can help by selecting low-emissions materials and using them efficiently.

Steel is an extremely useful material that has very high embodied emissions because CO_2 is a by-product of the steel manufacturing process itself; also this process is very energy intensive.

If cement were a country it would be the world's third-largest greenhouse gas emitter after China and the US.

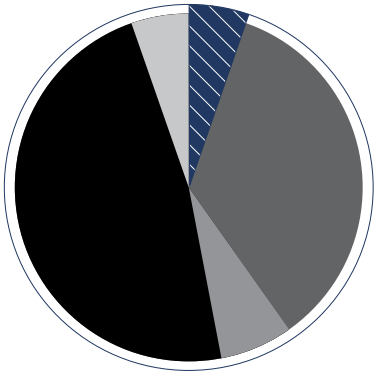
The specification of cement replacements (such as fly ash, pozzolanic cement and geopolymers) is one approach. Another approach is using higher-strength concrete in order to reduce the need for such large quantities.

Timber is grown from the process of photosynthesis, absorbing carbon dioxide (CO_2) and water and transforming them into sugars and oxygen. The weight of timber is roughly half sequestered carbon. Even when processing is taken into account, timber is usually a negative emissions product and, therefore it will have a negative global warming potential value; this is very positive!

If we cannot retrofit and need to build new, then we absolutely must consider embodied emissions alongside operational emissions. Steel and concrete have great physical properties but, where those properties are not required, we should aim to replace them with plant-based products, such as timber, to reduce the net embodied emissions of construction.

A BREAKDOWN OF NEW ZEALAND'S CARBON FOOTPRINT IN 2015

A) Production perspective

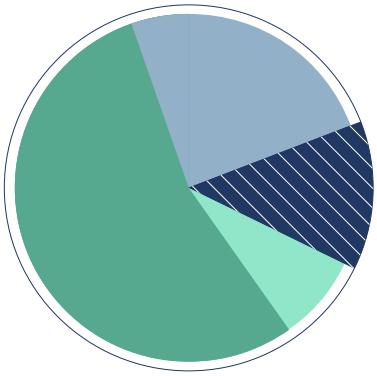


Building Energy Use	5%
Energy	40%
Agriculture	48%
Industry	7%
Waste	5%

80 Mt CO_2e NATIONAL TOTAL

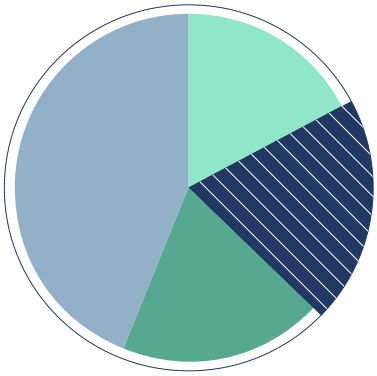
17 t CO_2e PER PERSON

B) Consumption perspective (excluding international trade)



Built Environment	13%
Nutrition	59%
Transport	19%
Other	9%

C) Consumption perspective (including international trade)



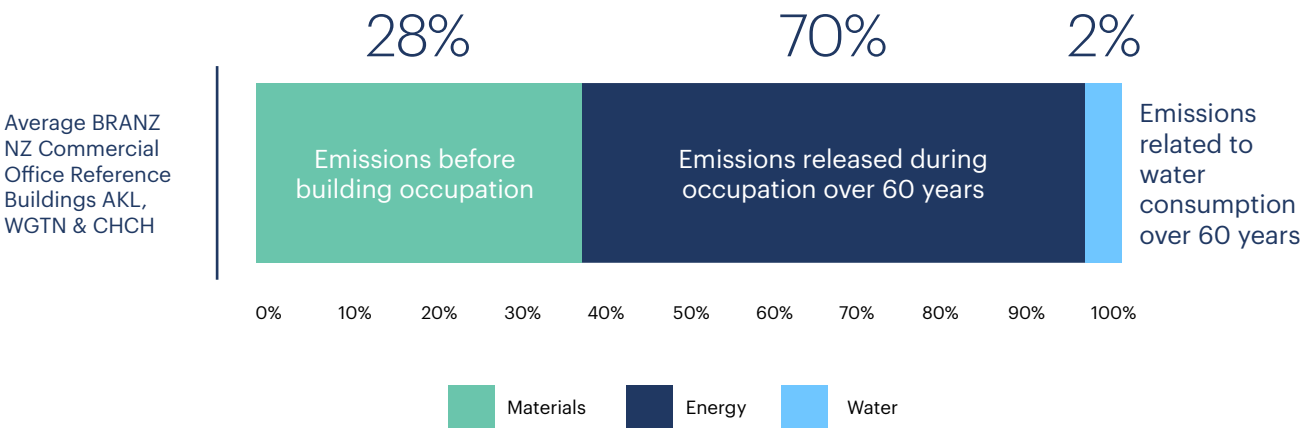
Built Environment	20%
Nutrition	19%
Transport	44%
Other	17%

60 Mt CO_2e NATIONAL TOTAL

13 t CO_2e PER PERSON

REF. Vickers, J., Fisher, B. and Nebel, B. (2018). The carbon footprint of New Zealand's built environment: Hotspot or not? Wellington: thinkstep. Available: thinkstep.com/content/carbon-footprint-new-zealands-built-environmenthotspot-or-not

COMMERCIAL OFFICE BUILDING LIFE CYCLE CARBON (60 YEAR): CONTRIBUTION ANALYSIS



To ensure zero carbon buildings in Aotearoa, the government must include the restricting of fossil fuel combustion in new buildings by 2026 and eliminating their use in new buildings by 2030 through the Building Code updates.

carboNZero Helps Samson Corporation Identify Boilers for Replacement

MARCO CREEMERS
Projects Director,
Samson Corporation

Samson Corporation has a commercial property portfolio in Auckland. As a family-run company, we take a long-term view on investments so operating responsibly is a key part of our company strategy. Our portfolio is a blend of the construction of new developments to hold and existing buildings that are retrofitted to meet modern operating standards. Any new developments consider sustainable design; the first was the iconic 5 Green Star Ironbank Building in 2009, and later the award winning 6 Green Star Geyser Building in 2012.

FAR LEFT:
Geyser Building

TOP LEFT:
Axis and Cumulus Building

TOP RIGHT:
Ironbank Building

Recently, Samson has turned its focus to carbon emissions and has made a science-backed target of reaching net zero emissions by 2030. Samson worked with Enviro-Mark Solutions to understand its carbon footprint and was delighted to be able to achieve carboNZero certification for the management of our organisation, in 2019, 11 years ahead of schedule.

Understanding and measuring our emissions means we are able to manage them and see where there is significant room for improvement. Through the carbon assessment, Samson found that an older building, which has a gas boiler for heating and refrigerants for cooling, had a huge footprint when compared to the rest of the portfolio. Samson has made a commitment to replace the boiler and is currently undertaking cost/benefit analysis to fast-track the replacement of services of this type.

It won't be a straightforward or easy process but is an insight into the kinds of challenges many industries and companies will face in the coming years. Decarbonising will be a disruption to the way many of us think and operate.

carboNZero certification is about measuring, managing and offsetting the remaining emissions but, foremost, it is about the commitment to reduce emissions year on year; this becomes harder and harder. The benefit of using a verified tool to measure impact is not only having a road map but gaining the ability to demonstrate and clearly communicate our progress towards our targets.

Reduce Peak Electricity Demand

New Zealand currently uses a mixture of hydro and gas peaking plant to meet winter electricity peak demand. As more demand for energy is met with intermittent renewables, such as solar and wind ,New Zealand will experience difficulties in meeting peak winter energy demand. As Transpower notes:

Where other countries will use solar matched to air conditioning to smooth seasonal peaks in electricity demand, New Zealand uses the greatest amount of electricity during winter. As solar will be significantly less effective in winter, but electrification will grow, the size of the winter supply shortage is expected to increase with the penetration of solar. New Zealand will continue to be exposed to winter and dry-year supply shortage risks because of continued reliance on existing hydro assets and the variability of solar and wind.

Buildings make up a significant part of this winter peak and, therefore, measures to reduce peak demand are particularly helpful in managing the transition to a 100% renewable grid. Peak demand is also increasingly likely to be subject to much higher electricity tariffs.

For this reason, we may introduce requirements to reduce peak energy demand as part of future definitions of zero carbon. Green Star Performance already sets out a standard for the reduction of peak electricity demand and this could be required as part of the zero carbon certification. The Passive House standard also includes some useful ideas about matching energy demand to renewable energy availability (Primary Energy Renewable factors).

We recognise, however, that further engagement is required with industry (and the electricity sector) before we finalise our approach.

Increase Skill Levels – Designing Low Carbon New Buildings

Delivering zero carbon buildings will require a mind-shift throughout the building industry, from investors to designers to product manufacturers and tenants.

It will mean prioritising long-term benefits over short -erm financial gains and investing in a low carbon future. Quantity surveyors should be encouraged to evaluate design not purely on capital cost but on Life Cycle Analysis (LCA) as well as Life Cycle Cost Assessments (LCCA), and carbon shadow pricing in all assessments of building options should be encouraged.

A zero carbon building industry will demand the upskilling of architects and engineers. Contractors will need to learn to deliver high-performance buildings as standard. This starts with universities and trade schools ensuring students are taught the basics of zero carbon design before they enter the workforce. Professional industry bodies, such as the Te Kāhui Whaihanga New Zealand Institute of Architects (NZIA) and Engineering New Zealand will need to build the knowledge of the industry through strategic professional development.

The lack of a knowledge base in the industry is currently largely the result of a lack of New Zealand-specific data. To change this will require investment in research at a high level so we can act from a science-based position. The skills shortage is mainly thanks to a lack of industry experience but this can be countered with a conscious effort in education and training.

TIPS FOR DESIGNERS WHO ARE AIMING TO REDUCE EMBODIED CARBON EMISSIONS:

1

Ask "Do you need it?" Reducing area or extra features is an easy way to reduce the impact of a project directly. The idea of dematerialisation reduces the need for additional build-ups for purely aesthetic reasons.

2

Carefully select materials and systems that use local materials and manufacturers. Select lower embodied materials and finishes by checking EPDs or simply swapping out concrete and metals and highly processed materials for natural or plant-based materials, such as timber.

3

Use BIM or BRANZ LCAQuick to measure volumes of material and calculate embodied emissions so they can be effectively managed or offset using certified carbon credits.

PRO TIP: The Green Star Life Cycle Impact credit offers seven points for Life Cycle Assessment or reuse of key structural systems.

To ensure zero carbon buildings in Aotearoa, the Government must ensure that the Ministry of Health, Ministry of Education, New Zealand Defence Force and Department of Corrections lead an all of Government shift to verify their new buildings as sustainable and lower embodied carbon from June 2020[3].

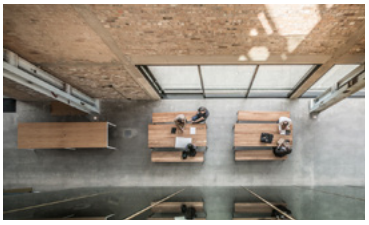
3. As part of this commitment the NZGBC also calls on Government to lead sector action and collaborate with product and material suppliers and other large procurers to reduce embodied carbon. This will help meet the MBIE Procurement Guidelines priority area of "supporting the transition to a net zero emissions economy" and assist the Government to meet its goal of "significant reduction in waste by 2020 and beyond".

Warren and Mahoney Developing its Expertise Around Zero Carbon Buildings

FIONA SHORT

Sustainability Specialist,
Warren and Mahoney

At Warren and Mahoney, we believe every project has the potential to contribute positively to occupant well-being, thriving communities and a flourishing natural environment.



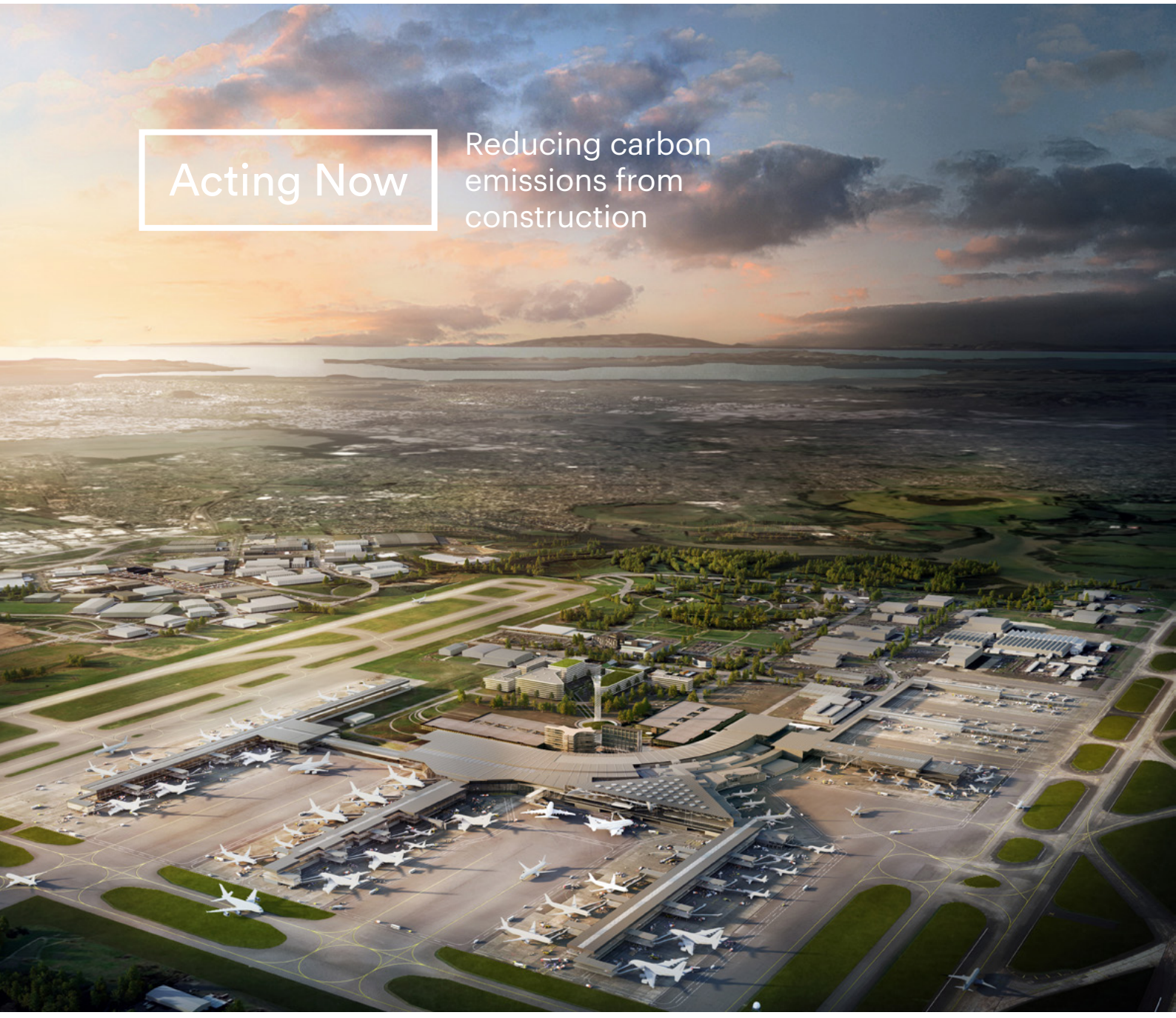
As designers, our aim is to bring this potential to life and deliver solutions that align with our clients' long-term strategic goals. Recently, we have been observing a shift in the ways in which our clients are approaching sustainability. We are seeing the market rapidly shift from trying to 'do less bad' to having a genuine desire to measure progress towards carbon-reduction targets.

Warren and Mahoney has been proudly carboNZero since 2007. We appreciate the benefits of using a verified carbon assessment tool to re-focus the building industry and to empower building owners to reduce the impact of their buildings where they can.

Recently, we designed the Mason Bros building for Precinct Properties which was awarded 6 Green Star and a 5.5 star NABERSNZ energy-efficiency rating. Today, this building is classified as world leading but, as high-performance buildings become business as usual, we are going to see a growing focus on the emissions associated with construction and building materials. The design for Mason Bros reused the structure from a 1920s' industrial warehouse. This has a huge positive impact on the embodied emissions of the building. I would love to see more creative adaptation of old structures for their unique characters but also because it makes complete sense from an emissions perspective.

Warren and Mahoney are already considering how zero carbon certification could be applied to our new build projects and how this impacts design. We have been developing the capability of measuring embodied emissions within the design tools we use every day. We can measure our designs and can see the impact of design decisions. I believe there is a great opportunity for the identity of New Zealand architecture to be shaped by a high-performance, low-carbon approach using local and natural materials and we're ready for the challenge.

Auckland Airport Begins to Focus on Embodied Emissions from Construction



MONIQUE CORNISH

Environment and Sustainability Leader, Auckland Airport

As one of New Zealand's largest listed companies and the country's fourth-largest property developer, Auckland Airport is facing unprecedented expansion and is doing it with carbon front of mind. Auckland Airport considers emissions in terms of company operations but even more important, in our line of business, is the embodied carbon of an expanding building and infrastructure portfolio.

We have developed a science-based (SBTI) emissions-reduction target of 45% by 2025, based on a CO_2e/m^2 2012 benchmark). Measured and monitored using CEMARS, this target applies to our scope 1 and 2 emissions but we also voluntarily disclose our scope 3 emissions. To date, we have achieved a 33% reduction by upgrading equipment, by switching to LED smart lighting and through more efficient fuel use. We are designing the refresh of our International Arrivals hall targeting 5 Green Star and the introduction.

We are now turning our attention towards embodied energy. This is especially pertinent given the expansion we face heading towards 2040. To address this, we calculate embodied carbon and use shadow carbon pricing to include the tangible value of building low carbon into a business case.

The introduction of a net zero building certification will be game-changing. It will require industry-wide collaboration to deliver low carbon built assets and this is a good thing. This certification will educate the industry and encourage the production of carboNZero products in New Zealand. Both concrete and steel, as currently manufactured, have very high embodied carbon. There will always be the need for them in infrastructure so we need to find the most sustainable ways to use them. As it is with operational emissions the approach is always to reduce by innovation and an analytical design approach first and then to offset.

In the race to becoming low carbon we can't forget about the socio-economic benefits. Auckland Airport is connecting with mana whenua and incorporating ideas of kaitiakitanga and the tikanga of building into its processes and developments. Our own Ara Jobs and Skills Hub connects South Auckland people with jobs and training opportunities in their community.

As the airport is the visitor gateway to New Zealand, growth is important but we need to strive for growth to give more. We want to achieve our important social and economic goals in the most sustainable way possible.

Establish Energy and Carbon Benchmarks for New Zealand Buildings

The last time a major study was carried out on the energy use of commercial buildings in New Zealand was 12 years ago. The BEES (Building Energy End-user Study), conducted by BRANZ in 2007, gives a reasonable picture of energy used by offices and some retail buildings (and was used as the basis of NABERSNZ) but there is a real lack of data on all other building types.

This is important if we want to know what good looks like.

To give one example, we don't have a clear understanding of what would be considered best-practice energy consumption in hotels.

NZGBC would like to use this net zero carbon road map as a clarion call to the sector to begin transparently publishing data on the energy use of different building types in New Zealand; this would allow owners to compare themselves against their peers.

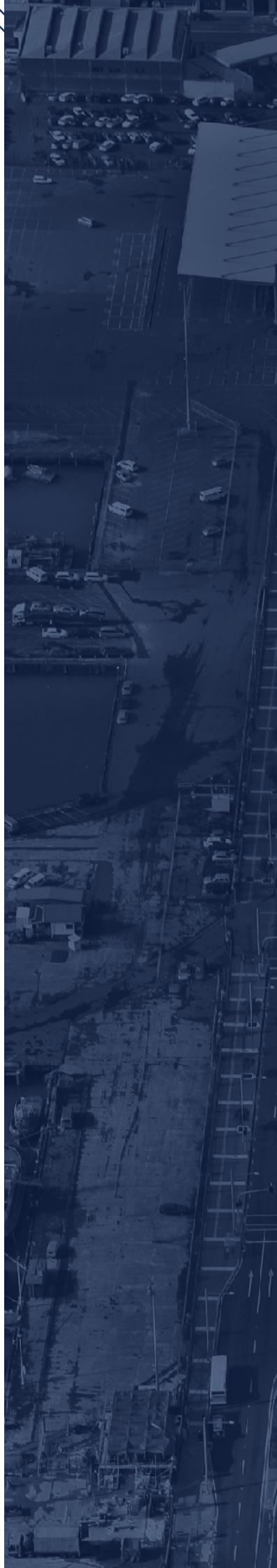
Coordinate Industry Action

Beyond having buildings rated, NZGBC is aiming to track where the built environment is at with regard to zero carbon and to coordinate industry efforts. The UK did this by forming an industry body called the Zero Carbon Hub in 2008:

Zero Carbon Hub

The Zero Carbon Hub was established as a collaboration (public/private body) between government and industry in 2008, to take day-to-day operational responsibility for achieving the government's target of delivering zero carbon homes in England from 2016. Before being disestablished in 2016 the Hub worked with both government and industry to raise building standards and reduce the risk associated with implementing the Zero Carbon Homes policy. The Hub conducted research into the challenges of achieving zero carbon homes including:

- analysing the gap between the designed and as-built energy performance of new homes
- understanding and tackling overheating in buildings
- trialling various aspects of the Zero Carbon definition in practice
- assessing indoor air quality and occupant comfort in new homes
- finding and publicising best practice and exemplar projects
- understanding and addressing future skills and knowledge requirements
- exploring approaches which raise awareness and interest in zero carbon homes among consumers.



Getting involved

STEP BY STEP

So, you've decided to take up the challenge of transitioning your building to zero carbon. This section gives you a step-by-step guide on how to get there.

Zero Carbon Commitment

Steps 1 and 2 involve making a commitment to a zero carbon future and publicly disclosing your building's energy bills. If you do this through the NZGBC, we'll send you a certificate to display your commitment. You can also be proud to be helping the building industry collate energy and carbon benchmarks for different building types: something that is sorely lacking in New Zealand. Step 1 is free and we will provide collateral and support at nzgbc.org.nz/zerocarbon

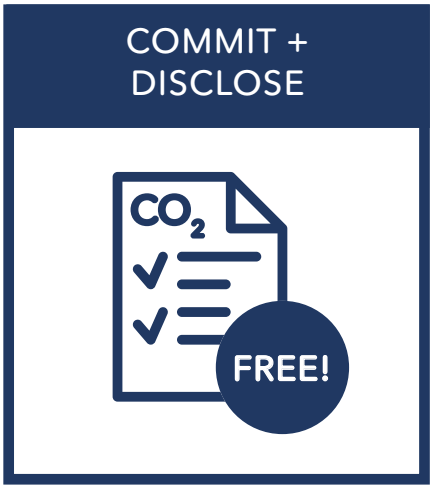
Formal carboNZero Building Certification

Steps 3 and 4 involve formally measuring your emissions, meeting a minimum level of building performance and offsetting any remaining emissions. The full technical requirements for this certification can be found here nzgbc.org.nz/zerocarbon

THE FOLLOWING GIVES AN OVERVIEW OF EACH STEP:

Step 1

COMMIT + DISCLOSE



We want to ensure that everyone can demonstrate their commitment to a Zero Carbon Future, regardless of how far along the journey they are or how sustainable their building is now. This step is simply about being clear regarding the journey you're embarking on.

Next, you'll need to report transparently the results of your building's energy bills over a 12-month period. NZGBC intends to provide a web portal for emissions reporting in early 2020. This site will provide benchmark energy and carbon data for different building types, allowing you to see how your building compares with its peers.

While we're in the process of developing our web platform, please send us your energy data by filling in the form that can be found at nzgbc.org.nz/zerocarbon and sending it to office@nzgbc.org.nz In return, we'll send you a certificate and keep you posted on further updates to our benchmarking efforts and the zero carbon certification.

Step 2

BENCHMARK + MANAGE

To receive full carboNZero Building certification, buildings will have to meet minimum carbon performance standards through either NABERSNZ or the greenhouse gas emission credits in Green Star Performance (see Box 1 on p.27).

At this stage, before formally registering for a rating, you may want to use some of the free tools available for benchmarking your building against the verification certification (see Box 1 on p.27). Next, you'll need to develop a carbon-reduction action plan to reduce emissions and meet the minimum required for certification (see Box 2 on p.29).

Now that you have a carbon-reduction plan and a baseline to work with, it's time to start making progress on projects and actions to ensure you meet the Minimum Building Performance Requirements (see Box 2, on p.29).

TOOLS FOR BENCHMARKING YOUR BUILDING'S ENERGY AND CARBON EMISSIONS:

NABERSNZ

NABERSNZ is a scheme to measure and rate the energy performance of office buildings. It was introduced to New Zealand by EECA Business in collaboration with the NZGBC.

The scheme is based on the National Australian Building Environmental Rating System (NABERS), which was launched in 1999 and is now mandatory for commercial office space of 1,000m^2 or more which is offered for sale or lease in Australia.

A NABERSNZ rating takes into consideration:

- the climatic conditions in which the building operates
- the building size and occupancy
- the hours of use
- the level of services it provides
- the energy sources (e.g. electricity, gas, coal, diesel) it uses.

NABERSNZ ensures your building is compared fairly against its market peers. The adjusted data is then compared to NABERSNZ benchmark data and a star rating is calculated that reflects your building's performance.

A free online self-assessment tool can be found on the NABERSNZ website. This will allow you to see roughly where your building stands if you have access to 12 months of energy data.

nabersnz.govt.nz/

Green Star Performance

Green Star Performance is a streamlined sustainability rating tool for existing buildings and building portfolios. The rating focuses on the operation and performance of entire buildings, allowing building owners, operators and occupants to collaborate and contribute to better environmental outcomes.

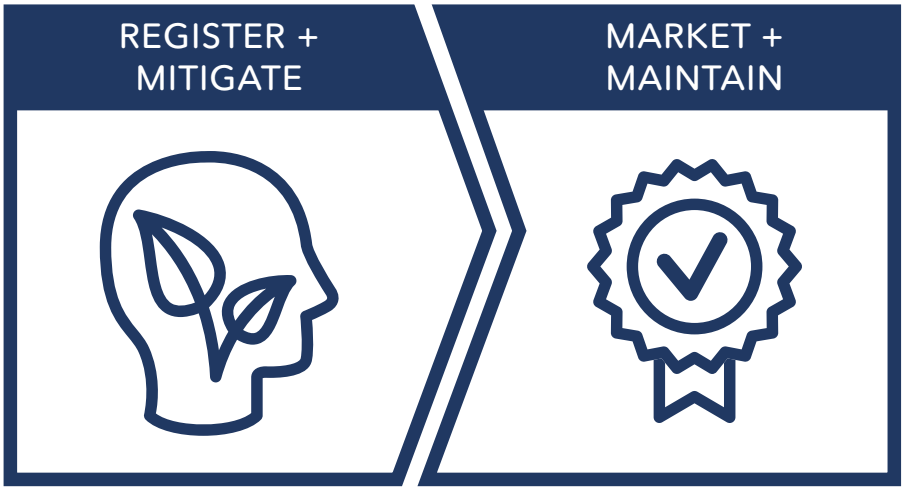
Green Star Performance establishes a common language for the monitoring and maintenance of operational performance. Almost any building type can use the Green Star Performance rating tool, including offices, retail centres, mixed-use buildings, hospitals, big box retailers, public buildings and higher education facilities. The minimum that is required for a certification is 12 months of water and energy data.

The energy calculators required for submitting an application for a carboNZero rating are freely available on our website and can be used to benchmark where your building stands prior to obtaining a rating.

nzgbc.org.nz/GreenStar

Step 3

Step 4



Once you're confident that you've met the minimum requirements, you'll need to register for carboNZero certification and submit data about your emissions and any supplementary material required by the programme. At this stage, depending on how the requirements evolve, we'll likely need to see reporting of the purchase of refrigerants and some Scope 3 emissions; these are emissions associated with products and services bought in connection with the operation of the building, such as waste disposal.

The final step before certification is to mitigate any unavoidable emissions through one of Enviro-Mark Solutions' offset programmes or any programme that meets the minimum offset requirements of the carboNZero Buildings programme.

Initially, we expect offsets to be through national offsets (typically forestry) or international offsets (typically carbon-reduction programmes in developing countries). Over time, we expect a wider range of national offset schemes to emerge; these will seek carbon-reductions from local industry, business or non-profits, or an educational provider to fund initiatives that sequester or remove a specified (and measurable) quantity of carbon.

Once you've offset remaining emissions, you'll receive your carboNZero Building certification!

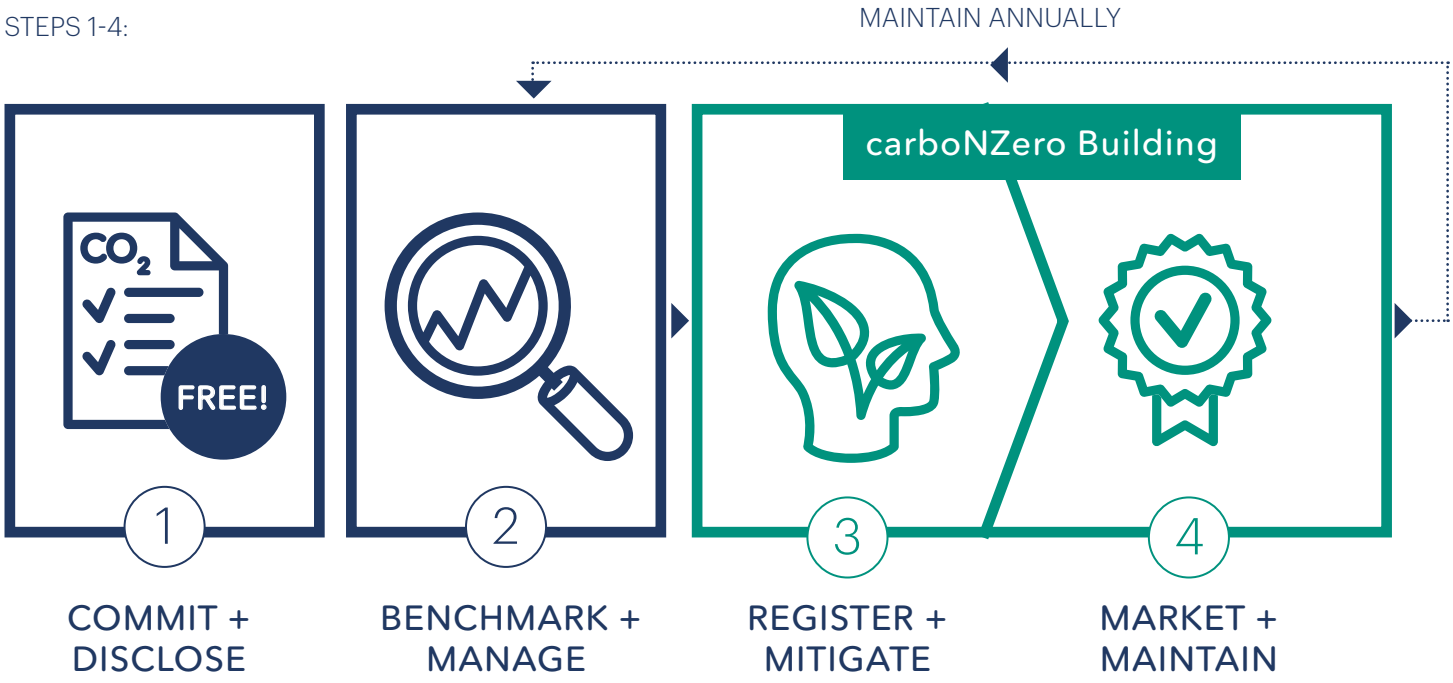
The hard part is over. Phew!

Now that you've received your carboNZero Building certification, it's time to think about how you tell your story of success to the world.

To maintain your certification, you'll need to resubmit your greenhouse gas data each year.

You'll also need to ensure that you continue to meet the minimum benchmarks as they increase over time. See below for details of how this framework will evolve.

STEPS 1-4:



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Minimum Building Performance Requirements

NZGBC expects buildings to meet a minimum level of carbon performance before the application of carbon offsets. This minimum performance standard is expected to get tougher over time (see "How the certification programme will evolve over time" below), but currently as it is (as of September 2019):

- 4 Star NABERSNZ rating or higher for all office buildings **OR**
- 8 out of 20 points (base building) or 9 out of 23 points (whole building) in the 'Greenhouse Gas Emissions' Credit of Green Star Performance. Note that it is not necessary to submit for a full Green Star Performance rating; NZGBC will allow registration for just the credits involved in a carboNZero submission.

AND

Demonstrate that you have a carbon-reduction plan for the building. This must include a plan to phase out all fossil fuel consumption on site by 2025.

Britomart Group Benefiting from Green Star Performance

Acting Now

Commitment to reducing portfolio emissions

CELIA WELLS

Property and
Sustainability Manager

Britomart has been bringing downtown Auckland to life with lively, high-performance mixed-use buildings since 2005. Aligned with our long-term vision, sustainability is a key objective across both our business operations and our in-house managed assets. Success is evaluated against environmental, social and economic sustainability results.

FAR LEFT:
Britomart Precinct

TOP LEFT:
Britomart East

ABOVE:
Australis Nathan Building

All our eligible buildings (of more than 2,000m²) have NABERSNZ ratings, which, along with energy-efficiency, declare their carbon emissions. In 2018, Britomart committed to a Green Star Performance portfolio of nine buildings measuring eight impact categories as well as innovation. We decided to use the Green Star Performance tool to evaluate the portfolio as it was aligned with our own facilities management strategies. Our leadership has always favoured a measured approach to facilities management, under the philosophy of what is measured is managed. The benefit of using a comprehensive rating tool is that it formalises the approach to collecting all the aspects we already measure, such as water, waste, gas and so on. And, it does this all in alignment and in one place. Green Star Performance makes it easy to report to the CEO in a way that is industry comparable. We have been pleased to find that this has also resulted in higher tenant satisfaction and fewer complaints, we measure complaints through surveys.

Once you have a benchmark, then it's easier to set reduction targets. We have publicly stated our target of a 10% year-on-year reduction for utility usage and waste creation. Having a clear commitment and goal makes everyday decision-making straightforward. The collaboration required to deliver our goals has strengthened our tenant relationships and community.

We choose to publish our targets openly because transparency and education are really important. We find some tenants are further along the journey than are others, and we all still have a lot to learn. We're looking forward to the challenge of year-on-year reductions in emissions and year-on-year community-building to achieve them.

carboNZero Buildings

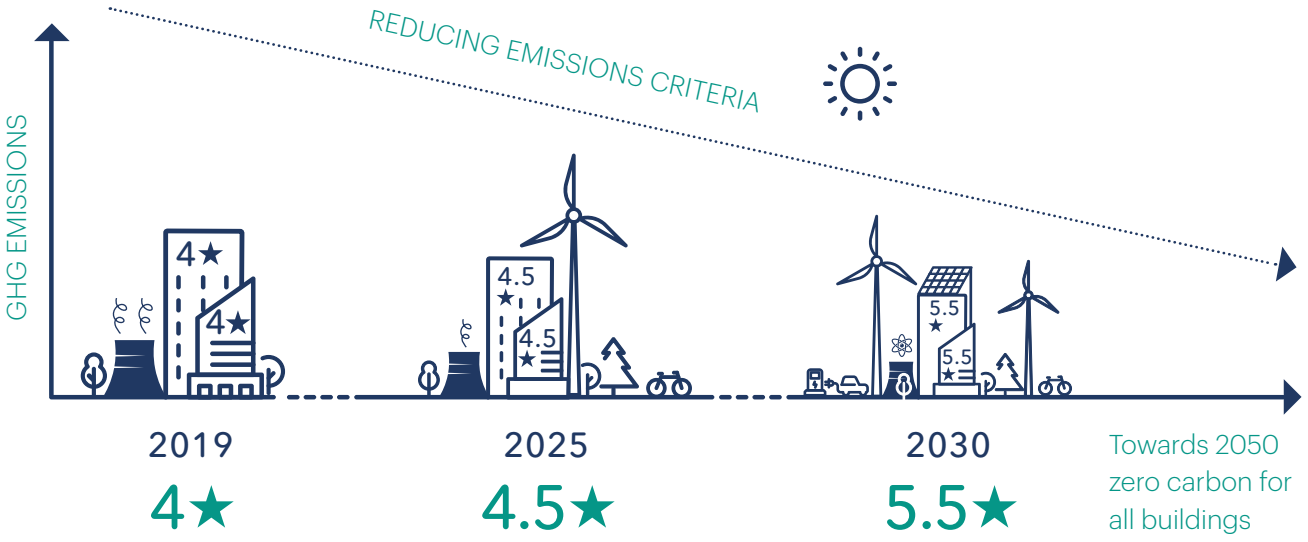
HOW THE CERTIFICATION PROGRAMME WILL EVOLVE OVER TIME

The carboNZero Buildings programme has the ambition of zero emissions for all buildings by 2050 and for new buildings to be able to demonstrate zero carbon emissions by 2030 (including embodied emissions). This is in alignment with the World Green Building Council's global goals.

The certification is designed to evolve over time starting with realistic market minimum building performance standards, which will tighten to move with available technology, knowledge and skills. This will also allow time for building owners to decarbonise their building stock to meet the requirements of the certification as it tightens. This evolution is intended to facilitate a smoother transition and mitigate the economic shock associated with step-change.

The programme is kicking off with measuring the operational emissions of existing buildings because we have the tools and skills to do this today. The minimum energy-efficiency requirement will start at a 4 star NABERSNZ rating and will increase incrementally to 5.5 star in 2030. An alternative compliance pathway is the Green Star Performance greenhouse gas emission standard which will also increase over time.

In addition to energy-efficiency requirements, no new buildings will be allowed to have fossil fuels combusted on site. For existing buildings, a commitment to phase out the use of fossil fuels will be necessary. The deadline for eliminating the use of any fossil fuels in a carboNZero certified building is 2025.



MINIMUM BUILDING PERFORMANCE STANDARDS:

Date	NABERSNZ for office buildings or any other buildings brought into the NABERS scheme	Green Star Performance energy credits for all other building types	Building must include:
2019	NABERSNZ 4 Star base building or whole building rating	8 out of 20 points (base building) or 9 out of 23 points (whole building) in the 'Greenhouse Gas Emissions' Credit of Green Star Performance	Existing buildings: carbon-reduction plan with strategy to phase out combustion of all fossil fuels on site by 2025 New buildings: no fossil fuels combusted on site
2025	NABERSNZ 4.5 Star base building or whole building rating	10 out of 20 points (base building) or 11 out of 23 points (whole building)	All buildings: no fossil fuels combusted on site (there may be some exemptions for minor uses such as standby generators)
2027	NABERSNZ 5 Star base building or whole building rating	12 out of 20 points (base building) or 13 out of 23 points (whole building)	All buildings: no fossil fuels combusted on site (there may be some exemptions for minor uses such as standby generators)
2030	NABERSNZ 5.5 Star base building or whole building rating	14 out of 20 points (base building) or 15 out of 23 points (whole building)	All buildings: no fossil fuels combusted on site (no exemptions)

THE ZERO CARBON ROAD MAP IS SUPPORTED BY:

Argosy

BAYLEYS

Precinct PROPERTIES NEW ZEALAND

Resene the paint the professionals use

WARREN AND MAHONEY

About the New Zealand Green Building Council

The New Zealand Green Building Council is a team of passionate advocates for better buildings, because we know that better buildings mean healthier, happier Kiwis.

We do this by working alongside politicians, industry and other businesses to bring change.

We believe that all New Zealanders deserve to be safe, healthy and happy in our beautiful country – at home, at school, at work. Everywhere.

nzgbc.org.nz

About Enviro-Mark Solutions

Enviro-Mark Solutions is the leading provider of environmental certification in New Zealand. Since 2001, its programmes have ensured that New Zealand companies are benefiting from international best practice, applied science, and effective tools. Enviro-Mark Solutions is a wholly-owned subsidiary of Manaaki Whenua - Landcare Research, a Government-owned Crown Research Institute. Though developed for New Zealand business needs, Enviro-Mark Solutions' offerings currently serve over 300 clients worldwide.

enviro-mark.com/home

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