

# Building for Climate Change

Research analysis of submissions  
received from the 2020 Building  
for Climate Change Frameworks  
consultation





**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT**  
HĪKINA WHAKATUTUKI

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# Foreword

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The Building for Climate Change programme has been set up to reduce greenhouse gas emissions from the building and construction sector, and to prepare our buildings for the ongoing effects of climate change, such as rising temperatures and increased rainfall. The sector makes a significant contribution to New Zealand's emissions – so it's important to seize this opportunity for transformation.

The Building for Climate Change programme is intended to change the way New Zealanders think about building and construction. Eventually, energy efficiency and carbon emissions will become core considerations when building, valued just as much as cost or time. The Building for Climate Change programme will result in people living and working in warmer, drier, and healthier buildings that generate lower emissions and are easier to heat and cool.

A number of changes will need to be made to current building laws to achieve this future. What the system is doing right now is not enough.

To find out what New Zealanders think needs to change, by how much and how quickly, the Ministry of Business, Innovation and Employment (MBIE) released two emissions mitigation frameworks for public consultation across September and October 2020.

A total of 374 submissions were received from a wide variety of individuals and groups in the building and construction sector. Local government, industry bodies, professionals, business owners and homeowners all provided valuable feedback.

MBIE received a clear mandate from these submissions – 92 per cent of respondents agreed that the sector needs to take action to reduce emissions. However, the submissions also noted how complex this work will be. As the building sector regulator, MBIE understands current pressures on the building sector and New Zealanders' challenges in relation to housing supply and affordability. These concerns will be taken into account as we work with the sector towards a lower-emissions future.

MBIE will use the feedback from consultation to refine the frameworks, taking the first step to achieving a lower-emissions future for the building and construction sector.

Thank you to all who took the time to contribute – your feedback is crucial to the success of the Building for Climate Change programme.

## **John Sneyd**

General Manager  
Building System Performance  
Ministry of Business, Innovation and Employment

# Contents

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<b>1. Executive Summary</b>	<b>6</b>
1.1. Submissions	6
1.2. Consultation snapshot	7
1.3. Next steps	8
<b>2. Introduction</b>	<b>10</b>
2.1. Context	10
2.2. Consultation methodology	11
2.3. Summary of responses to the consultation	12
<b>3. Overarching feedback</b>	<b>15</b>
3.1. Overall response to the Building for Climate Change programme	15
3.2. Building size and type	15
3.3. Existing buildings	19
<b>4. Whole-of-Life Embodied Carbon Emissions Reduction</b>	<b>22</b>
4.1. Scope of the proposal	23
4.2. Encouraging the use of low-carbon materials	24
4.3. Reporting on and capping embodied carbon	26
4.4. Support required to go 'low carbon'	26
<b>5. Transforming Operational Efficiency</b>	<b>30</b>
5.1. Proposed caps for operational efficiency	31
5.2. Implementing the Framework	33
5.3. Scope of the methodology	34
5.4. Energy modelling	36

<b>6. Key themes by stakeholder group</b>	<b>38</b>
6.1. Homeowners	38
6.2. Building owners	39
6.3. Designers and architects	40
6.4. Supply chain businesses and organisations	41
6.5. Central government agencies	42
6.6. Building Consent Authorities	42
6.7. Builders and trades	43
6.8. Construction industry specialists	44
<b>7. Future action</b>	<b>47</b>
<b>Appendix A: Consultation questions</b>	<b>49</b>
<b>Appendix B: Quantitative summary of submissions</b>	<b>59</b>

# 1. Executive Summary

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The Building for Climate Change programme will play a key role in ensuring the building and construction sector contributes to Government's climate change goals. It also provides opportunities to transform and future-proof New Zealand's built environment.

Between 31 August and 11 October 2020, MBIE undertook public consultation on two Building for Climate Change emissions mitigation frameworks:

- › **Whole-of-Life Embodied Carbon Reduction** – which proposes to set mandatory reporting and measurement requirements for whole-of-life embodied carbon emissions, including from the materials used in construction, the construction process, construction waste, and the disposal of a building at the end of its life.
- › **Transforming Operational Efficiency** – which proposes to set required levels of efficiency for energy use and water use and define minimum indoor environmental quality measures for buildings.

MBIE received 374 submissions from across the building and construction sector. The feedback provides a strong mandate for the work that will be delivered by the Building for Climate Change programme.

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## 1.1 Submissions

Almost everyone who submitted in this consultation supported the goals of the Building for Climate Change programme and agreed that the sector needs to reduce carbon emissions.

There was a strong sense of urgency from respondents, with many wanting to see the programme move more quickly. However, feedback also indicated significant complexities and compliance costs that the programme needs to take into account and, where possible, mitigate.

There was support for existing buildings to be included in the programme, though there was acknowledgement that this could introduce additional complexity.

Respondents broadly supported the goals of the Whole-of-Life Embodied Carbon Emissions Reduction Framework. Many respondents wanted to see a more comprehensive scope. Most considered that reliable, trustworthy information and clear guidance would be key requirements for successfully implementing this Framework.

Respondents overwhelmingly supported the goals of the Transforming Operational Efficiency Framework. Most respondents preferred a stepped approach to introducing operational efficiency requirements, but many would like to see faster timeframes for implementation. The scope of the framework is generally considered to be pragmatic, though there are some concerns about the complexities of regulating how a building should operate.

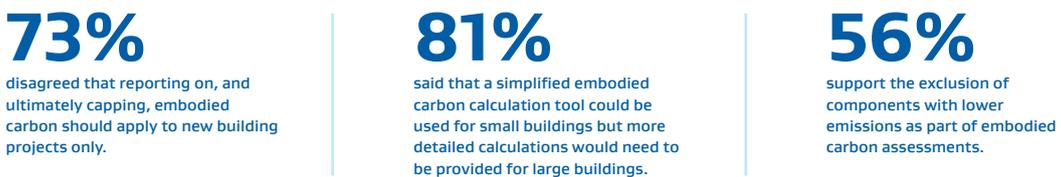
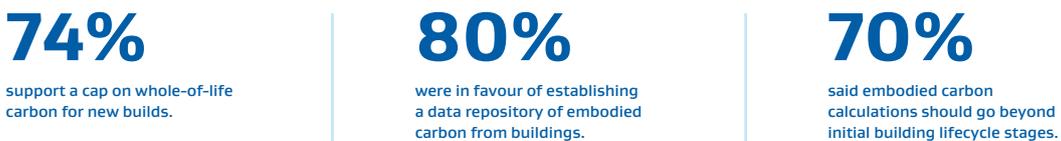
## 1.2. Consultation snapshot



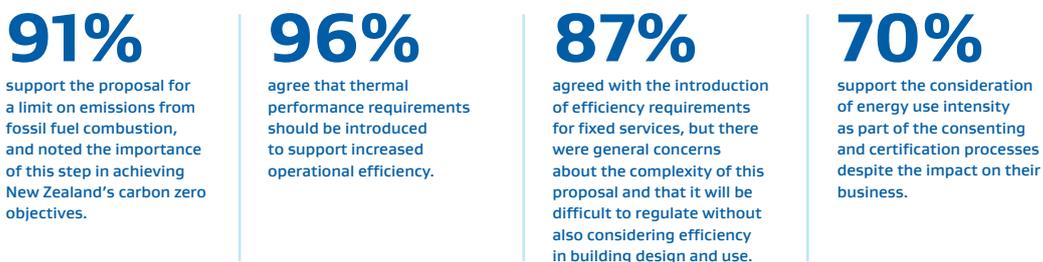
### Key results



### Feedback on Whole-of-Life Embodied Carbon Reduction Framework



### Feedback on Transforming Operational Efficiency Framework



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## 1.3. Next steps

MBIE will use the feedback received to further develop the Building for Climate Change programme, and to refine the technical methodologies for the two emissions mitigation frameworks. Targeted industry engagement in mid-2021 will seek detailed technical feedback on revised versions of the methodologies.

MBIE will also use the feedback to inform other actions that may be needed to support and enable the changes required to transform New Zealand's building and construction sector and meet our carbon emissions reduction targets. This will include considering non-regulatory tools such as information, education, guidance and financial incentives. MBIE is committed to working with the sector as we progress this work.

MBIE recognises this is a complex and transformative programme of work, so we need to take the time to get this right. Over the course of 2021 MBIE will refine the frameworks, assess options for how and when to implement them, and develop a package of policy interventions to enable and support them. Cabinet agreement to publicly consult on the full package of measures will be sought in early 2022.



## 2. Introduction

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### 2.1. Context

#### **Summary of the Building for Climate Change programme**

The building and construction sector is a large contributor to New Zealand's greenhouse gas emissions. This includes emissions from the production of building materials, the construction of buildings, and the generation of energy used in operating buildings. If New Zealand is to reach its climate change goals, including net zero carbon by 2050, the building and construction sector must play its part.

MBIE has established the Building for Climate Change programme to meet this challenge and get New Zealand building in a different way. Tackling climate change will require vision, commitment and perseverance as well as significant change. It will not be easy and will not be done overnight – but if done right, it will benefit us all.

The Building for Climate Change programme is intended drive transformative action across the building and construction sector. It will set targets and caps for energy use and carbon emissions, helping to change people's behaviour and the way they think about building. The proposed changes are also expected to achieve co-benefits including improved health outcomes and reduced energy bills.

Information, incentives, innovation, and changes to building laws and regulations will all be key parts of the change.

The Building for Climate Change programme Statement of Intent<sup>1</sup> provides more detail about the programme.

#### **MBIE's role in the Building for Climate Change programme**

The Building for Climate Change programme is led by MBIE's Building System Performance branch, which provides policy and technical advice on New Zealand's building system and implements building legislation and regulations to meet New Zealand's current and future needs. This enables the programme to align with other Building System Performance regulatory processes and workstreams, including the annual Building Code Update Programme and Building System Legislative Reform Programme.

#### **Purpose of this consultation**

From the outset, MBIE has committed to work with New Zealanders on the Building for Climate Change programme. We recognise the Building for Climate Change programme is ambitious and, to some, represents a significant change to the status quo.

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<sup>1</sup> <https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/emissions-reduction-targets/about-new-zealands-2020-net-position/>

<sup>2</sup> <https://www.mbie.govt.nz/dmsdocument/11522-building-for-climate-change>

This is why MBIE undertook early consultation on the proposed broad approach to the Building for Climate Change programme's two emissions mitigation frameworks:

**Whole-of-Life Embodied Carbon Reduction** – which proposes to set mandatory reporting and measurement requirements for whole-of-life embodied carbon emissions, including from the materials used in construction, the construction process, construction waste, and the disposal of a building at the end of its life.

**Transforming Operational Efficiency** – which proposes to set required levels of efficiency for energy use and water use, and defining minimum indoor environmental quality measures for buildings.

The input we received will inform the development of the frameworks' technical methodology and future policy and technical options.

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## 2.2. Consultation methodology

The consultation period covered 31 August to 11 October 2020. The consultation documents and options for responding were posted on the MBIE website<sup>3</sup>. Consultation responses could be provided in two ways, either through a structured survey on the consultation website or as a written response via email. The consultation survey questions are provided in Appendix A.

A communications campaign supported the consultation. To publicise the consultation, MBIE:

- › emailed key building and construction sector stakeholders and those who had signalled interest in the programme, inviting them to make a submission
- › issued a media release to wide range of building, property and construction media outlets and published articles in relevant trade publications
- › posted on social media including the MBIE Twitter, Facebook, and LinkedIn accounts
- › posted news items on the Building System Performance website
- › sent a reminder email to all stakeholders one week prior to consultation closing.

This communications campaign was supported with a paid advertising campaign on LinkedIn and Google Search. Ads on LinkedIn received 126,627 impressions, over 200 comments, and had a click through rate of 0.48%. The Google Search ads received 7,159 impressions, with a 20% click through rate.

Key organisations, including Engineering NZ, the New Zealand Institute of Architects, Local Government New Zealand and the Ministry for the Environment, also shared the consultation information on their communication channels at MBIE's request.

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<sup>3</sup> [www.mbie.govt.nz/have-your-say/building-for-climate-change-transforming-operational-efficiency-and-reducing-whole-of-life-embodied-carbon/](http://www.mbie.govt.nz/have-your-say/building-for-climate-change-transforming-operational-efficiency-and-reducing-whole-of-life-embodied-carbon/)

## 2.3. Summary of responses to the consultation

A total of 374 submissions were received, including 62 written submissions and 312 survey responses. Of those who responded, 199 (53%) responded on behalf of an organisation.

Table 1 provides a breakdown of survey respondents by their role.

**Table 1: Roles of survey respondents**

Role	Number of responses
Architect	52
Builder	8
Building Consent Authority/Officer	18
Building Industry Consultant/Advisor	23
Building owner	17
Building product/material supplier	33
Electrician	1
Engineer – other	32
Geotechnical Engineer	1
Plumber/Gasfitter/Drainlayer	1
Representative organisations	17
Scientist/Researcher	13
Structural Engineer	15
Other	65
Undetermined	78

Of the 117 survey respondents who provided their occupation in a free-text response, 28 worked in a role directly related to climate change. These roles included keywords such as: sustainable, carbon, climate, environment, energy, and passive.

Respondents were free to choose which parts of the survey to answer. Many chose to answer some questions but not others, so the number of responses to each question is provided. See Appendix B for a summary of quantitative submissions data.

### **Analysis approach**

Thematic analysis of the responses was conducted using NVivo 12 Plus qualitative analysis software. A bottom-up approach was used to code the data, meaning analysis was guided by the content.

After importing the data into NVivo and cleaning the data, MBIE analysts:

1. read the submissions to become familiar with the data
2. used NVivo's autocoding tool to identify codes based on keywords and phrases
3. created codes manually based on meaning
4. gathered the related codes into themes
5. defined and named themes based on their content.

This report provides a qualitative discussion of the themes. In describing the findings, qualifiers such as 'almost all', 'most', 'many', and 'a few' are used to show where there was agreement across many respondents or where a view was held by a small number of respondents.



## 3. Overarching feedback

### Summary

- › Almost everyone agreed that the sector needs to reduce emissions, and supported the goals of the Building for Climate Change programme.
- › Submissions highlighted the need for clear definitions of building size and type.
- › Many respondents wanted the programme to move more quickly and have a more ambitious scope.
- › Submissions expressed support for the emissions of existing buildings to be included in the programme's scope from the start.

### Next steps

MBIE heard strong support from across the sector for the proposed emissions mitigation frameworks. Using the feedback received, MBIE will continue to refine the frameworks' technical methodologies and consider what other actions might be needed to support and enable the proposed changes.

MBIE heard that many people want this action to occur quickly, and that there was support for the operational efficiency framework to be introduced in shorter timeframes than initially proposed. MBIE will take this into account as we assess the options for implementing the frameworks, and balance it with ensuring the frameworks are robust, effectively integrated into the building system, surrounded by appropriate support, and recognise market and housing affordability pressures.

MBIE heard strong support for the frameworks to apply to all kinds of buildings – commercial, communal residential and non-residential, housing, and industrial. MBIE will consider ways to ensure all parts of the built environment fairly contribute to New Zealand's emissions reduction goals, while continuing to take the differences between these building types into account.

MBIE heard support for the frameworks to apply to existing buildings, particularly following renovations and refurbishments. MBIE also heard feedback that outlined additional challenges and compliance costs with regard to existing buildings. MBIE will take both of these perspectives into account as we consider the range of regulatory and non-regulatory actions that could be taken with regards to existing buildings to meet the programme's goals.

MBIE heard concerns with the potential complexity and compliance costs of proposed emissions mitigation requirements. MBIE also heard that despite this, many people are up for the challenge of ensuring the built environment mitigates its contribution to climate change. MBIE will continue to be clear on what the potential complexities and compliance costs might be, and will seek to mitigate them as part of the broader programme.

This section presents a summary of feedback received from submissions relating to the Building for Climate Change programme broadly. Themes specifically relating to the Whole-of-Life Embodied Carbon Emissions Reduction Framework are discussed in Section 4, and those specifically relating to the Transforming Operational Efficiency Framework are discussed in Section 5.

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### 3.1. Overall response to the Building for Climate Change programme

Almost all respondents agreed or strongly agreed that the building and construction sector must take action to reduce carbon emissions. Many reasons were given as to why, and a sense of urgency was prominent throughout many responses.

Most respondents discussed the large relative contribution the building sector makes to emissions. For most, this high contribution alone was enough justification for change. Others noted the environmental impacts of climate change that result from emissions and the flow-on effects for future generations and the future of humankind.

A large number of respondents referred to New Zealand's emissions reduction goals, the international agreements that New Zealand has signed up to, and the responsibility that the building sector holds for contributing to them. For many respondents, reducing emissions is a responsibility for the sector not only because of its high contribution to emissions but also because it is fair that every sector contribute to reducing carbon emissions.

Many respondents pointed out that there are already materials, tools, processes, and standards that can be used to reduce emissions from buildings. Respondents suggested that using existing tools from New Zealand and overseas might present easy wins for the sector. Some suggested the Building for Climate Change programme use existing tools to avoid spending time and money 'reinventing the wheel'.

Most of those who disagreed that the sector needs to reduce emissions expressed concerns that regulatory changes might have negative impacts for the sector, building owners, and tenants. Key concerns included cost, compliance burden, and making houses less affordable.

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### 3.2. Building size and type

The emissions mitigation frameworks proposed to use building size and type definitions as mechanisms to define scope, develop carbon measurement tools, and set caps. The following definitions were proposed across both frameworks:

- › Small buildings: those that are 3-storey or less and 300m<sup>2</sup> or less gross external floor area.
- › Large buildings: those that are greater than 3-storey or greater than 300m<sup>2</sup> gross external floor area.

It was proposed that a number of different building types be included or excluded from the frameworks. The Whole-of-Life Embodied Carbon Reduction Framework proposed to apply to all building types, while the Transforming Operational Efficiency Framework proposed that:

- › The scope will include: housing, communal residential, communal non-residential, commercial and industrial buildings.
- › The scope will exclude: outbuildings and ancillary buildings, with some possible exceptions.

MBIE received a significant amount of feedback on the proposed definitions and their uses. The majority of respondents agreed with the distinction between small and large buildings on the basis of simplicity, pragmatism, and reducing compliance costs. While most respondents agreed with the proposed building type distinctions, a few asked for clearer definitions or a more comprehensive typology. Building size and type were interrelated throughout responses.

### **Respondents supported more detailed measurement requirements for large buildings**

Both frameworks proposed that simplified carbon modelling tools would be made available for small buildings to help owners and designers calculate and report embodied and operational emissions more easily. Owners and designers of large buildings would be required to use approved templates and tools for calculating and reporting their emissions.

Respondents overwhelmingly supported more detailed measurement and reporting requirements for large buildings. Some said the greater effort was proportional to larger buildings' potential emissions, while others felt it was the best investment of effort for the sector given the higher emissions from larger buildings. Large developments were considered more likely than small builds to have the resource to contract experts to undertake emissions measurement and reporting.

Almost all respondents agreed that it would make sense to provide simpler measurement and reporting tools for small buildings to reduce compliance burden. Some respondents explicitly mentioned that it would be less likely for smaller projects to have capacity and expertise for measuring and reporting their carbon emissions. Some raised concern about the accuracy of simplified measurement tools, especially when used at scale across many buildings.

Some respondents asked for simplified tools for large buildings to reduce compliance burden and create consistency across the system for both large and small buildings.

### **Some respondents suggested that excluding specific building types from emissions requirements may create regulatory loopholes**

The Transforming Operational Efficiency Framework proposed that a number of building types, such as outbuildings and ancillary buildings, would be exempt from emissions requirements. While just over half of respondents agreed with the exemption for both building types, many also noted that greater clarification may be required on what these building types included.

A number of respondents commented that how buildings are used, rather than what type of building they are, contributes to key differences in their emissions. For instance, buildings such as agricultural outbuildings, swimming pools and workshops have a high potential for emissions, but may not be regularly occupied by people. There was some concern that excluding these building types from operational efficiency requirements may introduce opportunities to evade regulation, which would run counter to the efforts to reduce operational emissions across all buildings.

### **Almost all respondents assumed small buildings would be houses**

It was implicit in almost all responses that small buildings were assumed to be houses. At times they were explicitly referred to as houses, while other respondents discussed small buildings as if they would always be owner-occupied. A few respondents explicitly asked that the size distinction be replaced by a residential / non-residential distinction.

This assumption influenced the concerns respondents discussed about the definition and its use. Some respondents said that small buildings were largely responsible for peak time drain on the energy grid, which made regulation of small buildings' operational emissions necessary. Others said that as occupiers directly pay small buildings' energy costs, they would be more likely to self-regulate. Some argued for interventions to improve information about energy use from consumer products.

Some respondents did not assume that all small buildings would be houses. The way apartments were discussed was a prominent example. Some assumed apartments would be treated as large buildings, which was seen as appropriate when calculating embodied carbon or managing operational emissions from building resources that the building owner or body corporate were responsible for. Other respondents suggested that apartments must be treated as multiple small buildings because individual occupiers decided how to use energy in their units.

### **A number of respondents sought changes to building size and type definitions**

The proposed size and type definitions were challenged by a few respondents. A few building owners highlighted that the National Policy Statement on Urban Development has a different definition of small buildings, which could create confusion.

Some respondents discussed projects which involved multiple small buildings, particularly those with shared facilities such as schools and retirement villages. Respondents were uncertain about whether these projects would be considered many small buildings or whether the project should be analysed as a whole, and raised concerns about unintended consequences from each type of measurement because of the combination of building types and uses.

A few respondents suggested that while building size was appropriate for determining what calculation tools or compliance pathways would be required for a building, it was too simplistic for setting caps.

Several respondents suggested that caps could consider intended occupancy of buildings rather than their size. They said that capping emissions by building size would create a number of unintended consequences including incentivising bigger houses, creating equity issues, and preventing tiny houses from complying with emissions requirements. Respondents pointed out that this ran counter to the Frameworks' objectives.

Several respondents suggested the caps consider building use or complexity instead of size. One respondent noted that under the proposed settings, a large 350m<sup>2</sup> warehouse would come under the requirements for large buildings despite having a simple design and using comparatively few materials.

Similarly, respondents were concerned that any buildings included or excluded from regulation based on type may create unintended consequences. Some suggested that buildings may be incorrectly labelled outbuildings or ancillary buildings to avoid regulation, or that these buildings would be of sufficient size to produce relatively high emissions and warrant their inclusion.

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### 3.3. Existing buildings

MBIE heard a strong message from many respondents that while starting with a focus on regulating new buildings might make sense, the programme must plan for and signal the inclusion of existing buildings in the programme's scope as soon as possible.

Both Frameworks proposed that existing buildings would be out of scope initially, but would be introduced into the scope at a later date. This would mean that:

- › Under the Whole-of-Life Embodied Carbon Emissions Reduction Framework, refurbishment and renovation projects would not initially be required to measure or report on embodied carbon.
- › Under the Transforming Operational Efficiency Framework, existing builds would not initially be required to complete remedial work to improve operational efficiency and reduce emissions.

However, many respondents strongly felt that existing builds should be included in the scope of these frameworks at the outset. A large majority of respondents thought new and existing buildings should have to meet embodied carbon reporting requirements and caps, while half of the respondents thought that operational efficiency requirements should apply to new and existing builds.

#### **Respondents preferred a stepped approach to including existing buildings**

MBIE heard strong support for taking a stepped approach to introducing emissions regulations for existing buildings. Respondents expressed a number of reasons for this, including to:

- › reflect the complexity involved in developing regulation for existing buildings
- › enable the programme to signal changes to the sector in advance
- › reflect the cost of remedial work to building owners
- › allow time for the sector to prepare for the change through training, capacity building, and process change.

Those who supported the stepped approach recognised the complexity of implementing the frameworks and saw new builds as a logical first step in terms of simplicity and cost effectiveness.

Regardless of how soon respondents wanted to see existing buildings included, they recognised the potentially significant challenges and costs for implementation. Though many respondents saw regulation of existing buildings' emissions to be a fundamental change in how the regulatory system operates, they considered it was important to achieve government's emissions reductions goals. It was acknowledged that this would be a complex issue to address as current regulation of existing buildings only occurs under certain conditions.

### **Respondents raised a number of risks if existing buildings are excluded**

A large proportion of respondents supported including existing buildings in the programme's scope now and suggested that regulatory requirements for existing buildings be introduced more quickly than was proposed. Many respondents felt that there was a risk in waiting to introduce requirements across both operational and embodied emissions.

Some respondents noted that existing buildings contribute a high proportion of buildings' operational emissions, and that given the typical life span of buildings they will continue to make up a high proportion of New Zealand's building stock far into the future. They also highlighted co-benefits of retrofitting existing buildings such as improved health outcomes, decreased absenteeism, and reduced energy poverty.

Many respondents suggested that excluding certain building activities or life stages when calculating embodied carbon would make it difficult for the Framework to fully achieve its intended impact. Additionally, these respondents suggested it may create perverse incentives or limit opportunities to achieve longer-term or more significant emissions reductions.

A few respondents noted that excluding refurbishment projects from consideration until later is a lost opportunity, as it would lock in additional emissions when renovations take place before carbon reporting or budgeting requirements are established. However, others cautioned that important remedial work should not be disincentivised by imposing onerous compliance costs. This was particularly important where remedial work could extend the life of a building and prevent emissions from demolition and rebuilding or contribute to the improved wellbeing of building occupants.

Many respondents who advocated for the inclusion of existing buildings said that including extensions, renovations, and major maintenance work on existing buildings would be easy – it was discussed as 'low-hanging fruit' to improve existing buildings' emissions.

A number of respondents suggested that requiring reporting about existing buildings and starting to gather data from them sooner rather than later would provide an important baseline for the programme which could be used to measure success and support the development of regulations.



## 4. Whole-of-Life Embodied Carbon Emissions Reduction

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### Summary

- › Respondents broadly supported the goals of the Whole-of-Life Embodied Carbon Emissions Reduction Framework.
- › Reliable, trustworthy information and clear guidance were seen as key requirements for successfully implementing the Framework.
- › Many respondents wanted to see a more ambitious and comprehensive scope.

### Next steps

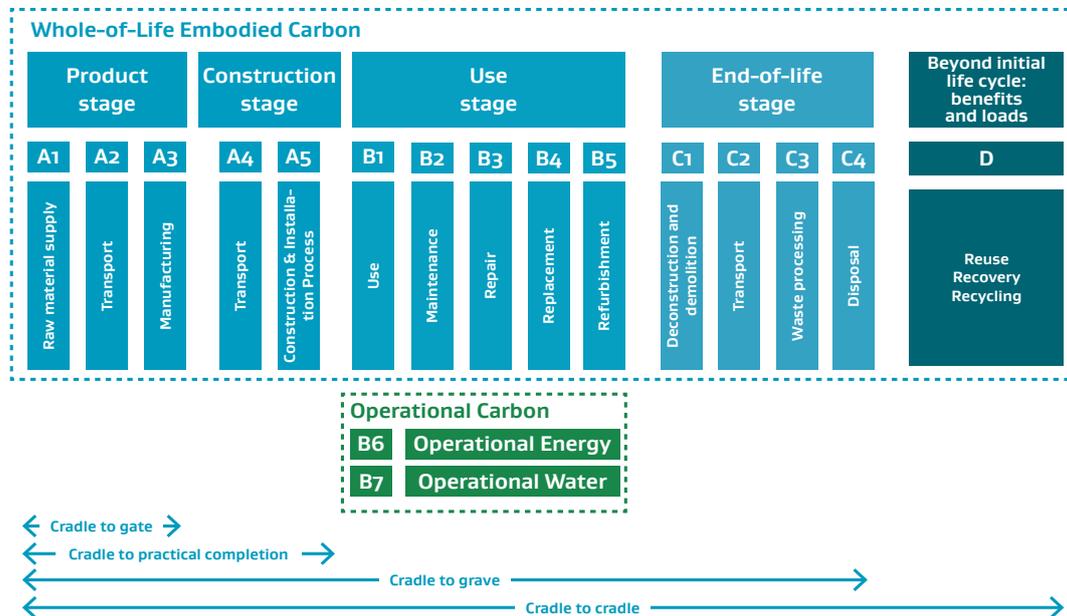
The Building for Climate Change programme will reflect the feedback by:

- › undertaking a broader and more detailed analysis of the potential barriers to embodied carbon assessments and the increased use of efficient, recycled or reused building materials
- › identifying a pathway to make embodied carbon assessments easier – including developing carbon calculation tools for simple buildings and approaches to carbon calculation for more complex buildings, and identifying accessible and reliable data sources and information inputs
- › undertaking work to better understand the skills that might be required from the building and construction workforce to implement the proposed embodied carbon requirements.

The most immediate next step is to use the consultation feedback to refine the Whole-of-Life Embodied Carbon Reduction Framework’s methodology. MBIE will undertake further targeted industry engagement in mid-2021 to seek detailed technical feedback on a revised version of the Framework methodology.

The Whole-of-Life Embodied Carbon Reduction Framework proposed to determine embodied carbon emissions across a building’s life cycle, taking into account the size of the new building (New Build Efficiency), the quantity of materials used in construction (Material Efficiency) and the carbon emissions from the construction materials (Carbon Intensity). *Figure 1* illustrates the different stages of a building life cycle.

Figure 1: Module framework for life cycle assessment of buildings



This section presents a summary of feedback received from submissions that relate to the Whole-of-Life Embodied Carbon Reduction Framework.

#### 4.1. Scope of the proposal

This Framework proposed to initially focus on specific building life cycle stages, components, projects and types in order to balance achieving outcomes with mitigating negative impact on the sector. While the areas where changes are expected to have the greatest emissions reduction proportionate to the effort required would be included in the initial scope, it was proposed that the scope increase over time to deliver greater emissions reductions.

##### **Respondents want to see all life cycle stages included**

The Framework proposed that the initial scope only requires calculating and reporting of embodied carbon at the product and construction stages (A1 – A5 in Figure 1). The use and end-of-life stages, including maintenance, demolition and waste stages, and considerations around reuse of materials in future buildings were excluded from the proposed scope.

Over two-thirds of respondents disagreed with the proposal to limit the requirements to the product and construction stages of the building life cycle. The most common theme across all comments was that respondents would like to see consideration of how further life cycle stages would be included in the future. While the initial limits were generally considered sensible, a broader view of how the later stages would be incorporated would enable the industry to take action now while developing a more comprehensive approach for the future.

Respondents expressed concern that limiting activity to the early life cycle stages would miss an opportunity to improve existing buildings' embodied carbon. Some respondents felt that this would discourage consideration of longer-term objectives and lead to perverse outcomes such as the use of lower-carbon materials without considering whether they are sufficiently durable or reusable.

### **Respondents were split on what building components should be in scope**

Just over half of respondents agreed with the types of building components the Framework proposed to include in embodied carbon assessments.

It was proposed the Framework include building components that are most significant in terms of emissions, and to exclude the many components that would be onerous to report and yield lower levels of emission reductions. The Framework proposed to include structural elements (frame, floors and foundations) and the building envelope (roof, cladding and windows) while excluding internal fittings (finishes, building services and fixed furniture).

The most common theme to appear throughout the responses, particularly among those who agreed with the proposal, was that while it was pragmatic to start with the 'low-hanging fruit', all building components should be included in the assessment process over time. Many respondents noted that while lower emissions components may appear to have less of an impact overall, they still add up. Some also noted that internal fittings are likely to be replaced far more often than structural or envelope materials so may contribute to a larger impact over the life of the building.

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## 4.2. Encouraging the use of low-carbon materials

### **Information and education are considered key contributors to encouraging the use of low-carbon materials**

MBIE proposed that encouraging the use of low-carbon materials would contribute to the Framework's objective of reducing the carbon intensity of materials used in construction.

When asked for feedback on how to encourage the use of low-carbon materials, the most common message from respondents was that there is a need for accessible, consistent and reliable information, particularly on what it means to be 'low carbon'. Many suggested that contributing to further research and the development of data tools is a vital first step that would equip members of the industry with the information required to make effective decisions.

Some respondents suggested that MBIE consider actively incentivising or even mandating the use of low-carbon materials. This could take the form of changes to the Building Code or reducing the administrative costs involved with consenting a project that incorporates low-carbon materials.

### 4.3. Reporting on and capping embodied carbon

MBIE proposed that reporting on whole-of-life embodied carbon for buildings be carried out as part of the building consent process. It was proposed that a methodology for building designers be developed to enable them to calculate whole-of-life embodied carbon, ensuring fair comparisons between different buildings and materials. The methodology would be refined over time as the scope of the Framework expands, and could cover:

- › recommended sources of embodied carbon data, appropriate for the New Zealand context
- › methods for determining how to report material quantities
- › assumptions and exclusions
- › how to manage issues such as rates of material waste, biogenic carbon content of natural materials, and emissions from transport and construction processes.

MBIE proposed that Building Consent Authorities would process whole-of-life embodied carbon reporting as part of the building consent application, and that they have ways to ensure it is fit-for-purpose and of an acceptable quality standard. A basic reporting format would be used to make this process as simple as possible, and having the data publicly available would allow it to be audited to ensure the reporting is adequately representative of the buildings.

#### **While broadly supportive of reporting requirements, respondents expressed concerns about the impacts on industry**

While many respondents noted their agreement with the proposed reporting requirements, the most common concern was about how this requirement might increase costs for the industry, and ultimately the consumer. For example, the requirement for new skills and expertise could add to capability and capacity strains already facing the industry.

Another key theme was that increased reporting requirement might impact building consent activity if it presented a further burden on a process with legislated time limits. A number of respondents were concerned about the additional requirements for Building Consent Authority staff and the increased workload involved in understanding and assessing the data in order to issue a consent. Some respondents also highlighted the issue of material substitution during the construction stages as a particular difficulty for implementing this requirement effectively.

#### **There was strong support for establishing a publicly accessible repository of embodied carbon data**

The Framework proposed that data on buildings' embodied carbon, collected from the reporting stages, would be stored in a repository and made publicly available. This could enable the information to be shared in a transparent and open way for the benefit of the collective knowledge of the sector. The majority of respondents agreed with this proposal.

Comments supporting this proposal noted that it would increase access to information and create a resource from which the industry could learn and improve, helping to reduce barriers to implementing reporting requirements. Those who did not support the proposal noted that the requirements would be an additional administrative burden for members of the sector. Across all comments there were some concerns that while 'naming and shaming' poor performing buildings might drive some improvement, it could also have adverse impacts on the market.

The feedback was broadly supportive of the data repository being accessible by the public, noting that increased transparency would build trust in the industry. In addition, the access to information may lead to increased awareness of the benefits of low-carbon buildings and encourage public support of this type of construction activity.

### **Respondents were broadly supportive of caps on embodied carbon, but wanted more information**

The Framework proposed to introduce a cap on new buildings' embodied carbon, which must be met in order to obtain a building consent. The cap would be introduced after the initial reporting requirements have embedded into the system, and the cap levels would be set in line with best practice recommendations and in consultation with the sector to ensure they are ambitious but achievable.

A majority of respondents supported the introduction of a cap on whole-of-life embodied carbon for new building projects, with many noting that it had the potential to encourage awareness of embodied carbon and incentivise reductions. The key theme throughout most of the comments was that more information was required about how this initiative would be implemented.

Despite broad agreement with the proposal, respondents voiced concerns about the complexity of setting a cap for whole-of-life embodied carbon in a way that recognises the range of building needs across a geographically diverse country. There was also some uncertainty about whether a cap was the most effective tool compared with other approaches, such as incentives to encourage the use of low-carbon materials.

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## 4.4. Support required to go 'low carbon'

MBIE asked respondents what support they would need to implement the Whole-of-Life Embodied Carbon Emissions Reduction Framework. Respondents wanted to see comprehensive education and training for the sector, standardised tools and templates to simplify the reporting process, clear reporting guidelines and reliable data about the embodied carbon of materials, and the removal of regulatory restrictions on recycling building materials.

Respondents also suggested that embodied carbon calculation tools and templates be developed in partnership with the industry. They noted that these tools should be consistent, credible and accessible in order to ensure that they are easily adopted.

### **Training is needed to help people meet new requirements**

Nearly all respondents suggested that training tailored to different people's roles in the system would be needed to enable them to meet the Framework's reporting requirements.

Many respondents noted they would like more training across all aspects of the industry, such as in the design of low-carbon buildings, the methods for calculating whole-of-life embodied carbon, and the processes for assessing this information at the consenting and code compliance stages.

### **Respondents want reliable material emissions data and clear guidelines for reporting embodied carbon**

Many respondents agreed that the lack of an agreed methodology and inadequate data quality and data availability would be the biggest challenges to report the whole-of-life embodied carbon of new buildings. More than three-quarters of respondents indicated that the lack of appropriate tools or software would make reporting difficult and a similar proportion said that it would be an administrative burden on businesses.

Many respondents expressed concern about the availability and reliability of data about material emissions. Without a trustworthy source of data some respondents felt that calculating and reporting on embodied emissions would be difficult and costly, resulting in unreliable data and negatively impacting on the intended emissions reduction objectives.

Some respondents were concerned about whether the benefits of increased reporting outweighed the additional training and administrative costs to the industry. Some respondents noted that the proposed requirements would require significantly increased capability within the industry when it is already struggling to meet current needs.

Respondents indicated that guidance, information and clear and reliable data sources along with a straightforward methodology would help to upskill the industry and contribute to the uptake of reporting requirements.

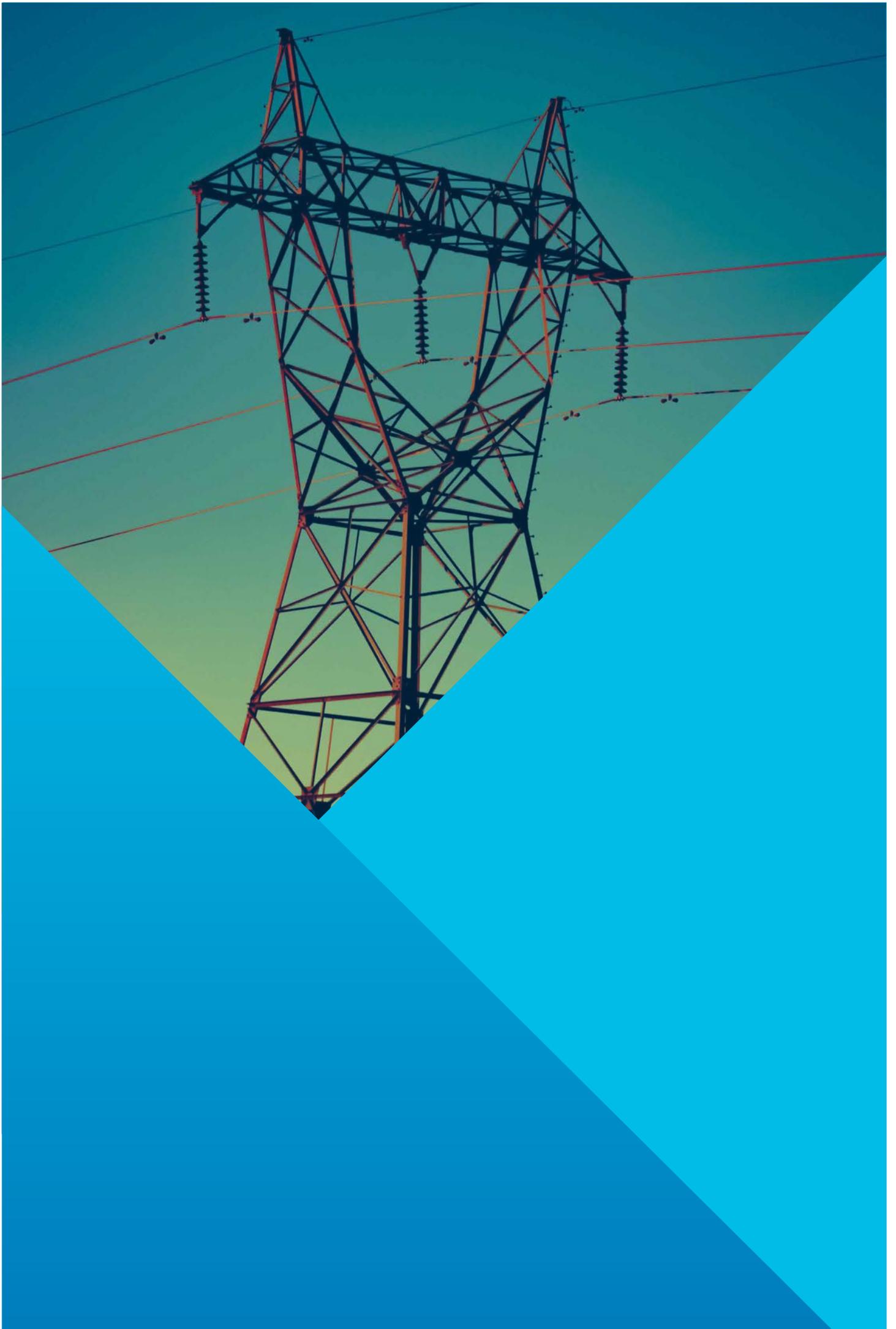
### **Respondents had a variety of suggestions to facilitate construction waste reduction**

MBIE asked respondents what measures they thought should be put in place to reduce construction waste. The most common suggestion was for as many materials as possible to be reused and recycled. This focus on reuse and recycling was laced throughout most responses, as was a focus on designing buildings with construction waste in mind.

Respondents suggested a wide variety of interconnected methods for reducing construction waste, including:

- › Some respondents noted that current building material recycling infrastructure is limited and needs significant work to make it a viable means of reducing building waste. Several of these respondents highlighted access issues for building projects outside major cities.

- › Many respondents suggested MBIE reviews requirements for timber to be chemically treated, as this creates additional, unnecessary material wastage. Others noted that some building materials are more able to be reused and recycled than others.
- › Some respondents suggested that the onus could be on manufacturers to reduce construction waste, and that manufacturers play a greater stewardship role in the system.
- › Respondents offered a number of suggestions for making reuse and recycling of building materials more feasible. A large number of respondents suggested mandating waste management and minimisation planning for building projects, noting that planning was a pre-requisite for effective recycling.
- › Many respondents suggested that the consenting process would be a suitable vehicle for requiring waste management and minimisation planning. Some went further, suggesting a requirement that a minimum percentage of waste be reused and recycled. This was seen as a useful incentive and likely to make recycling more feasible.
- › Many respondents highlighted proposed changes to the waste levy, agreeing that increased fees for disposing of construction waste at landfills provided a strong incentive to increase recycling and reuse of materials.



## 5. Transforming Operational Efficiency

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### Summary

- › There is broad support for the Transforming Operational Efficiency Framework's proposed measures to improve buildings' operational efficiency, particularly through the implementation of operational emissions and water use caps.
- › Most respondents agree with a stepped approach to introducing operational efficiency requirements, but many would like to see faster timeframes for implementation.
- › The scope of the Framework is generally considered to be pragmatic, though there are some concerns about the complexity of regulating how a building should operate.

### Next steps

The Building for Climate Change programme will reflect the feedback by:

- › identifying potential pathways to integrate elements of the Framework that received significant positive feedback (such as thermal performance requirements) into the regulatory system
- › considering a range of options for decreasing operational emissions from, and increasing the performance of, existing buildings
- › developing or identifying appropriate operational efficiency calculation tools that could be used across the sector, and identifying accessible data sources and information inputs
- › Working to better understand the skills that might be required in the building and construction workforce to implement the proposed operational efficiency requirements.

The most immediate next step is to refine the methodology for how the Transforming Operational Efficiency Framework might measure energy use, water use and indoor environmental quality. MBIE will undertake further targeted industry engagement in mid-2021 to seek detailed technical feedback on a revised version of the Framework methodology.

MBIE will also incorporate any relevant feedback received through consultation on proposed Building Code changes launched on 28 May 2021. These proposed changes aim to support higher-density housing and ensure buildings are more energy efficient, and therefore align with many of the Building for Climate Change programme's objectives.

The Transforming Operational Efficiency Framework proposed to set caps on buildings' energy use and water use, and to define minimum indoor environmental quality requirements. This is intended to improve the operational efficiency of buildings to reduce emissions, while also improving the health and wellbeing of building occupants.

This section presents a summary of feedback received from submissions that relates to the Transforming Operational Emissions Framework.

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## 5.1. Proposed caps for operational efficiency

### **The Framework proposed mandatory Operational Emissions and Water Use Caps**

The Transforming Operational Efficiency Framework proposed to set:

- › a mandatory Operational Emissions Cap, setting out the total allowable annual emissions per square meter per annum for all new buildings. This would include requirements for fossil fuel combustion, electricity use and water use, with electricity use having requirements for thermal performance, services efficiency and plug loads
- › a mandatory Water Use Cap, setting out the total allowable potable water use per square meter per annum for all new buildings.

### **There is broad support for overall caps but less certainty about the detailed requirements**

Nearly all respondents agreed that the Building for Climate Change programme should include measures to improve the operational efficiency of buildings in New Zealand. Many of those respondents described the flow-on effects of implementing such measures, which could include the financial savings from reduced energy use and improved health and wellbeing for building occupants.

A large number of respondents suggested the additional caps that are proposed to sit within the overall Operational Emissions Cap, such as electricity use and services efficiency, should have less rigid targets. This would help to increase flexibility and innovation in the sector as people determine how to meet the Operational Emissions Cap from the options available to them.

Many respondents wanted further detail about each of the caps, including how compliance would be measured and monitored over time.

### **Most respondents supported limiting emissions from fossil fuel combustion and introducing thermal performance requirements**

The majority of respondents supported the proposal for a limit on emissions from fossil fuel combustion, commenting on the importance of this step in achieving Government's climate change goals.

Many respondents noted that this proposal might require broader discussion around energy generation and consumption in New Zealand, including the impacts on other sources of electricity. Of the few respondents who did not support a limit on emissions from fossil fuel combustion, some requested that more consideration be given to different types of fossil fuels and their use rather than excluding them as a single group.

Nearly all respondents agreed that thermal performance requirements should be introduced, with many commenting that this would bring New Zealand more in line with international standards. Many respondents who supported this requirement noted that this was an important factor in reducing the operational costs of heating and cooling buildings, as well as improving the health and wellbeing of building occupants.

The few respondents who disagreed with this proposal felt that market demand rather than regulation would be a more effective driver of change in buildings' operational efficiency.

#### **Almost all respondents agreed with efficiency requirements for fixed services, but there were concerns about complexity**

MBIE asked whether detailed requirements for fixed services (such as heating and cooling systems, artificial lighting, hot water systems and appliances, ventilation systems, etc.) should be introduced in the Building Code to support the operational efficiency of buildings.

Although the majority of respondents agreed with this proposal, their comments suggested that they consider services efficiency to be one part of a building's broader operational performance, so it would be difficult to regulate without also considering the overall efficiency of that building's design and use.

#### **Many respondents consider that plug loads are driven by occupant behaviour and may be challenging to regulate**

MBIE proposed that plug loads for large buildings would be in scope for the framework and plug loads for small buildings out of scope.<sup>4</sup> Respondents' views on this were split, with much of the feedback appearing to be based on an assumption that small buildings were houses.

A few respondents felt that regulating plug loads may not be necessary given that the energy used by fixed services such as heating and cooling systems is likely to be dependent on the thermal performance of the building itself. They considered that regulating for thermal performance may therefore be a more straightforward and effective option for managing energy use than regulating plug loads.

#### **There were mixed views on how electrical appliance efficiency and on-site water collection, storage and treatment should be addressed**

MBIE proposed excluding electrical appliance efficiency, on-site water collection and storage, and on-site water treatment from the Framework's scope. Around a quarter of respondents felt that all three elements should be included, while a fifth said none should be included.

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<sup>4</sup> 'Plug load' refers to the electricity used for appliances, electrical and electronic devices that people plug in to use in buildings, including electric vehicle charging.

Two-thirds of respondents indicated that on-site water collection and storage should be included. Many respondents noted that this element had broader sustainability implications as it has the potential to increase community resilience as well as relieve pressure on regional infrastructure systems. Water collection was also generally considered more practical to implement with minimal ongoing costs for building owners.

Several respondents noted that while improvements to electrical appliance efficiency might be achieved through other measures such as the restrictions on plug loads or consideration of the Energy Efficiency and Conservation Authority's energy performance standards, it was still important for the building system to acknowledge the role of appliance efficiency. Some respondents commented that consumer behaviour played a strong role in the purchase and use of efficient appliances so this element should be incentivised but not compulsory.

One third of respondents felt that on-site waste water treatment should be included. Many respondents noted that this was a more challenging and potentially costly measure to implement due to sanitation requirements, and may be better managed through district planning or water management regulations.

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## 5.2. Implementing the Framework

MBIE proposed that the Operational Emissions Cap and Water Use Cap would tighten in a series of steps, reaching a final cap by 2035. It was proposed that the steps be published at the outset to provide clear signals and guidance to the sector on what standards they will need to achieve. It was also proposed that MBIE work closely with professional, trade and training bodies in the sector to disseminate the requirements and provide guidance on methods and tools that may be used to achieve them. It was proposed there be a particular focus on support in the period before each new step is implemented.

### **Most respondents agreed with a stepped approach to introducing new operational efficiency requirements**

The majority of respondents supported a gradual introduction of operational efficiency requirements, but more than half thought reaching the final stage by 2035 is too long. One third of respondents thought the 2035 timeframe is appropriate, and only a small number of respondents thought it would be too short.

Most respondents felt that the proposed approach was realistic and would allow the industry to adapt to the introduced changes, without impeding delivery. Some respondents noted that many houses are already being built to the proposed standards, particularly those that incorporate passive design, so they felt the proposed caps were realistic and achievable.

Many respondents encouraged greater urgency, particularly in response to the government's climate emergency declaration. The most common suggestion was to work towards overall implementation by 2030, which would bring the industry in line with international practice more rapidly and reflect targets set in the Paris Climate Agreement.

Many respondents recognised that construction work often operates on long timeframes, meaning that any changes to regulations would take time to be incorporated into new projects. They therefore called for the requirements to be implemented sooner so that emissions reductions can be realised within the proposed timeframes.

Of those respondents who suggested the proposed timeframes were too short, most expressed concern that the industry would need a significant amount of support and capability to adjust to changing requirements. This was a common theme across all responses, including those recommending shorter implementation timeframes.

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### 5.3. Scope of the methodology

#### **Half of the respondents agreed that on-site renewable energy generation or storage capacity should not be required**

Respondents were split as to whether new buildings ought to be required to include on-site renewable energy generation or storage capacity. Although half of the respondents agreed or strongly agreed, one fifth disagreed or strongly disagreed.

Regardless of their position on the proposal, many respondents noted that the priority should be to encourage efficiency through building design before looking to more costly and complex interventions such as energy generation and storage. Many respondents suggested that while buildings should not be required to have the technology for energy generation and storage, they should be designed with the capacity to allow for its addition, such as with particular roofing or wiring specifications.

Several respondents noted that the renewable energy generation and storage technology was not always financially or logistically feasible for many building sites and may not necessarily produce the expected benefits in some situations. Consideration may need to be given to the types or locations of buildings that would be able to optimise the incorporation of on-site energy generation. Another alternative would be to consider energy generation and storage on a broader scale, incorporating such technology into community-wide projects.

A number of respondents expressed concerns that the capacity for energy generation in buildings would be used to offset inefficiency in energy consumption, which would act as a disincentive to improving the operational efficiency of both new and existing building stock. There were also concerns that the benefits of energy generation and storage technology may not necessarily outweigh the environmental costs of their production or disposal. As such, these types of initiatives may need to be considered as part of the whole-of-life embodied carbon calculations of the building.

### **Some respondents suggested additional elements for inclusion in the proposed Indoor Environmental Quality parameters**

The Framework proposed that buildings would need to meet suitable Indoor Environmental Quality (IEQ) parameters to ensure they contribute to occupant health and wellbeing outcomes. The following critical IEQ parameters were proposed:

- › air temperature
- › relative or absolute humidity
- › ventilation rates (minimum and maximum)
- › surface temperature (relative to air temperature)
- › hygienic surface temperature (avoidance of mould)
- › daylight provision.

Respondents broadly agreed with these IEQ proposals.

Some suggested the addition of indoor air quality, such as measures for bio-contaminants or allergens, particulates, volatile organic compounds, and gases. Respondents also related this to the use of non-toxic and low-volatile organic compound materials in building components, which they felt should be incorporated as part of this measure.

Some respondents also suggested measures for acoustic performance be included, noting that noise protection was a critical factor in occupant health and wellbeing.

A number of respondents commented that the proposed parameters required more clarification or specification on how they would be measured. For example, there were comments about aligning calculation rates for ventilation and relative humidity to international best practice. Several respondents felt that daylight provision should include references to building site positioning and access to outdoor space, with others noting that the overall quality of lighting (including artificial sources) should be considered.

Other respondents emphasised that the elements needed to be considered as a system, accounting for how they interact with each other. Some noted that setting overall IEQ performance standards rather than individual measures would allow for variation in design that balances each of the elements.

Several respondents indicated that they would like to see ongoing monitoring of building performance to ensure that the IEQ parameters are maintained over time.

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## 5.4. Energy modelling

MBIE proposed that energy modelling be required when designing buildings, including calculations for the following:

- › an overall operational emissions cap in CO<sub>2</sub>-e/(m<sup>2</sup>.a)
- › emissions from fossil fuel combustion in CO<sub>2</sub>-e/(m<sup>2</sup>.a)
- › electricity use in kWh/(m<sup>2</sup>.a)
- › thermal performance energy use in kWh/(m<sup>2</sup>.a) for heating and cooling demand
- › delivered services energy use in kWh/(m<sup>2</sup>.a).

MBIE proposed to work closely with businesses and with professional, trade and training bodies in the sector throughout Framework implementation to disseminate the requirements and provide guidance on methods and tools to achieve them.

### **Many respondents supported the consideration of energy use intensity**

Many respondents supported the proposed requirements for thermal performance and services energy use intensity to be modelled as part of the consent application and code compliance certification processes. This is despite the fact that many respondents noted it would have an impact on their business.

Respondents' main concerns around this proposal were that more training and guidance would be required at consent application and evaluation stages. Some felt it would add complexity to a process that is already challenging to manage within the legislated timeframes.

### **Respondents supported the introduction of standardised measurement tools**

Many respondents suggested they would like to see the adoption of standard tools and measures to ensure energy use intensity modelling is consistent and practical to implement. A number of respondents identified existing tools and calculation methods that could be adapted for use in the New Zealand context.

Many respondents noted that increased workforce capacity and training would be required, particularly for those involved in building design and assessment. Several suggested that this could be incorporated into existing educational and accreditation programmes, with additional resources for those who already work in those fields.

Some respondents also suggested that design guides, checklists and updated Acceptable Solutions could be provided to support the implementation of these requirements. Additional support could take the form of incentives, such as reduced consenting fees or processing times.

Respondents would also like to see regular monitoring to assess how well buildings continue to perform and whether any later adjustments to requirements are necessary. They suggested this information be provided to building owners through reporting or a type of building warrant of fitness.



## 6. Key themes by stakeholder group

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This section presents a summary of feedback received from different stakeholder groups. It is intended to reflect that different subsectors of the building and construction sector have different priorities and provided different feedback to the proposals.

Feedback from the following stakeholder groups is summarised in this section:

- › Homeowners
- › Building owners
- › Designers and architects
- › Supply chain businesses and organisations
- › Central government agencies
- › Building Consent Authorities
- › Builders, trades and industry organisations
- › Construction industry specialists

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### 6.1. Homeowners

Fifteen submissions were received from homeowners. Due to the relatively low number of responses from this group, targeted follow-up research is planned to better understand their perspectives and experiences. An overview of key issues raised by this group is below.

#### **There were concerns about potential increased costs to building a house**

Many homeowners were concerned at the potential cost of implementing the proposed changes. They noted that any increased construction cost that is borne by end-users could reduce buy-in to the Building for Climate Change programme and potentially reduce the number of residential buildings being constructed.

Some respondents from this group suggested that the best way to address the risk of increased cost was to encourage or incentivise construction of smaller houses. A further suggestion was to invest in energy efficient products that are not currently available in New Zealand.

#### **Information is required to support consumers to make the right choices**

Submissions from homeowners indicate that there is a willingness to support low carbon emission building and construction, but that many homeowners feel they lack the necessary knowledge to make the right choices. Feedback indicates that any tools or information products that might be provided would need to be accessible and practical.

## 6.2. Building owners

Twenty-one submissions were received from building owners, including developers, commercial building owners, landlords, and other individuals whose interest is in a building that they own but usually do not use for themselves. An overview of key issues raised by this group is below.

### **There were concerns about potential increased costs to building**

Building owners strongly supported the intent of the Building for Climate Change frameworks, with many describing the proposed changes as necessary to meet broader emissions reduction targets. However, almost all were concerned with the potential cost of implementing the proposals in the Frameworks, particularly costs associated with new materials, innovation overheads, and time.

A common concern related to the potential impact of placing further responsibility on Building Consent Authorities, which could result in longer consent processing times and increased costs. There was concern that Building Consent Authorities currently have considerable responsibility in the system, and asking them to also be experts in sustainable design and building would further strain system efficiency.

Building owners also noted that any increase in the cost of new buildings could create perverse outcomes where building owners might keep older, less efficient buildings in order to avoid the costs of complying with the proposed requirements for new buildings. This would undermine attempts at emissions reduction.

### **Education and information are required to support people to engage**

A clear theme in building owner feedback was the need for extensive education to be provided across all stakeholder groups – including consumers, designers, and builders. Any education would need to be easy to understand, demonstrate the benefits of building sustainably, provide clear practical guidance for how to meet new requirements, and enable the sector to understand new materials and innovative processes.

Building owners felt that the Building for Climate Change programme would increase upfront building costs. However, they also felt that education demonstrating the financial savings across the life of an energy efficient building could help encourage a shift to thinking about whole-of-life costs.

Many building owners were concerned that new requirements could slow the building consent process, and were clear that guidance and support from central government would be required to mitigate disruption to the building consent process.

### **There were concerns about access to sustainable materials**

Many building owners were concerned that sustainable materials are not readily available on the market, and that it will be difficult to meet any embodied carbon caps without viable alternatives to higher emissions materials that are currently used. Some noted that existing regulations prevent reuse and recycling of building materials, and that regulations would need to change in order to encourage appropriate reuse and recycling of these materials.

Submissions suggested that making sustainable choices should be simple, with easily understood information about the embodied carbon and operational efficiency of materials being made available. Standardised labelling of materials would make it easier for consumers to make informed decisions.

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## 6.3. Designers and architects

Forty submissions were received from designers and architects. An overview of key issues raised by this group is below.

### **Key barriers include cost, short-term thinking, and low industry expectations**

Designers and architects identified a range of barriers to the reduction of carbon emissions including high costs, lack of agreed methodology or measurement tools, short-term industry thinking, and low consumer education and expectations. They indicated that clients were challenged by high, and increasing building costs which can create tension between affordability and sustainability.

Some design and architecture businesses highlighted high administrative burdens, an industry reluctance to build beyond minimum standards and short-term thinking that did not promote more sustainable building practices.

### **There was support for legislative change and appropriate regulatory performance requirements**

Many designers and architects considered Building Act change to be necessary to enforce higher minimum building standards. Some also requested changes to Acceptable Solutions in the Building Code and promotion of good planning aligned with infrastructure developments.

Designers and architects also raised the need for appropriate regulatory performance requirements to encourage sustainable building and reduce carbon emissions. Most in this group advocated for 'lean design', the removal of barriers in reusing construction materials, and incentivising the use of low-emissions materials.

### **More education and awareness is needed to enable change**

There was a strong demand for increased education and awareness to implement any new Frameworks. Submissions identified knowledge gaps within the industry and across the wider community, particularly around expectations of sustainable and healthy built environments.

Designers and architects highlighted the need for clear, consistent standards, training, and access to reliable information. They expressed a need for resources such as accessible tools and information, for example a data repository and best-practice models to guide decision-making. Wider conversations across industry and with consumers would be valuable in refining and disseminating any new requirements.

## 6.4. Supply chain businesses and organisations

Forty-five submissions were received from individuals and organisations across the construction sector supply chain. These submissions represented a broad range of suppliers, including those from the concrete, steel, timber, and Heating, Ventilation and Air Conditioning (HVAC) sectors. An overview of key issues raised by this group is below.

### **A robust methodology is required to make comparisons between the emission profiles of different materials**

Supply chain organisations provided a significant amount of feedback regarding comparisons between construction materials. Some felt that any embodied carbon calculation methodology needs to accurately reflect the life cycle of materials by taking into account not only production, but also maintenance, demolition, potential for reuse, and disposal of materials. Submissions from the steel industry noted that it will be important to consider products' suitability for the building's expected durability, lifespan, safety requirements, and intended use.

Some submissions identified a risk in New Zealand-produced materials having to compete with imported products, to which the Emissions Trading Scheme does not apply. A proposed solution was for the embodied carbon methodology to accurately account for transportation emissions.

While they acknowledged the complexity of comparing emissions profiles of different building materials, a strong theme from these submissions was that the agreed methodology and any associated tools should also be easy to use.

### **Barriers to reducing construction waste were identified**

Submissions from this group expressed strong support for reducing construction sector waste, with many respondents calling on government to remove regulatory barriers to the reuse and recycling of construction waste. Suggestions from the concrete industry included construction waste being incorporated into concrete, and repurposing concrete as aggregates.

The supply chain sector also commented on the high level of waste created by construction material packaging.

### **There was support for the Framework's scope to be wider and timeframe more ambitious**

While there was strong support for the Building for Climate Change programme across supply chain submissions, many submissions suggested the proposed timeframe for implementing the final caps by 2035 is too long. They expressed support for bringing this deadline forward.

A common issue raised was that excluding existing buildings from the initial roll-out of the Frameworks would significantly limit their potential impact. Submissions also noted that including existing buildings in the initial roll-out would increase employment opportunities, as demand for energy efficiency retrofits would be significant.

There was also some concern that the Transforming Operational Efficiency Framework focuses on operational efficiency, rather than operational emissions.

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## 6.5. Central government agencies

Seven submissions were received from central government agencies. An overview of key issues raised by this group is below.

### **Central government agencies require more knowledge, resources and expertise to reduce emissions**

Submissions identified that more knowledge, resources and expertise are needed across central and local government to respond to carbon emissions reduction requirements. Many noted the need for significant support and education in a range of areas including guidance on regulatory issues, procurement, best practice models and resources such as free, accessible data sources. Upskilling for both government and industry was strongly encouraged.

### **A diverse range of barriers were identified**

A diverse range of existing barriers and some possible solutions to them were suggested. Some parts of central government, for example the health sector, emphasised the specific barriers they face.

Barriers identified included the lack of local infrastructure to respond to the reduction of carbon emissions, the wide variation in current practices, significant capital costs, and current building consent and compliance requirements. Submissions highlighted existing government initiatives designed to reduce carbon emissions in various sectors.

### **The Building for Climate Change programme should consider alignments with other existing central government work**

Responses suggested there is an appetite to better understand the relationships between Building for Climate Change programme and other related central government work such as urban intensification or the regulation of transport emissions.

There was also some consideration of how public sector agencies could work together to lead a transition toward the objectives of the Building for Climate Change programme, including how shared frameworks could accommodate sector-specific requirements.

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## 6.6. Building Consent Authorities

Fifteen submissions were received from Building Consent Authorities. An overview of key issues raised by this group is below.

### **There are cost barriers for building owners and Building Consent Authorities**

Submissions identified concerns with cost barriers, including how costs would be shared through the system. A lack of council resourcing prompted many to raise concerns around additional obligations that may be needed to enforce the proposed requirements.

Other barriers included gaps in expertise, technical skills and appropriate standardised tools and processes with which to do the work.

### **Greater support is needed to effect change**

Submissions noted the need for greater support for all parties involved. This could include financial incentives to encourage a shift to carbon reduction, easily accessible information to inform decision-making, and suitable training for industry and Building Consent Authority staff. Respondents in this group saw standardised tools and processes for carbon calculations as especially important. Most were keen for some sort of expert body or certification system to be established so that the onus for calculating emissions did not fall on councils.

### **There was a strong perception that central and local government should lead the way**

Submissions emphasised the importance of government leading the way. A number mentioned the need for central government regulation, with government agencies and councils leading by example. A need was identified for a consistent regulatory approach that is regularly reviewed and updated to keep pace with technology.

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## **6.7. Builders, trades and industry organisations**

Twenty-three submissions were received from builders, trades and industry organisations. This total included 14 builders, one electrician, one plumber, four respondents from the energy and gas sector, and three respondents from industry organisations. An overview of key issues raised by this group is below.

### **There is a need for clear standards with comprehensive training**

Submissions from all parts of this group, and from builders in particular, expressed a need for clear, consistent requirements and standards and comprehensive training to enable the sector to meet them consistently.

Builders in particular cited a lack of leadership from government on how to achieve standards. Most respondents asked that any system implemented was straightforward to understand.

Commonly identified barriers included cost, the Building Code not keeping in step with proposed changes, and a lack of willingness by the industry and homeowners to innovate.

### **Energy and gas sector respondents argued against reducing gas consumption**

Energy and gas sector respondents within this group argued against the need to reduce gas consumption to achieve Government's climate change goals. They highlighted technological developments such as the decarbonisation of energy and gas, and noted the potential for the energy and gas sector to provide low carbon options, value and choice to consumers.

Respondents in this group encouraged a broader discussion about the most efficient, affordable and effective ways to decarbonise New Zealand's economy rather than imposing restrictive targets.

### **A clear roadmap for change would support an orderly transition**

Industry organisations identified a diverse range of barriers to implementing the Frameworks, including potential supply chain issues, lack of data on global standards for imported materials, and the lack of an agreed system to manage cost and compliance.

Submissions expressed the need for support on a number of levels to ensure an orderly industry transition without capability or economic losses. Potential supports included clear roadmaps to targets, carbon calculation tools, best practice models, training at all industry levels for emissions measurement, and education on waste minimisation.

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## 6.8. Construction industry specialists

One hundred and eight submissions were received from construction industry specialists. This total included 51 submissions from engineers, 14 from researchers, 23 from sustainability consultants, and a remaining 20 from quantity surveyors, project managers, regulatory consultants, and people in other specialist roles. An overview of key issues raised by this group is below.

### **Clear, consistent guidance is needed to achieve low-carbon standards**

A common theme was the need for clear consistent communication and guidance on how to achieve low-carbon standards. A number of engineers highlighted the need to consider all stages of building, including how low-carbon measures could be incorporated from design through to operational performance.

Submissions sought standardised reporting and assessment methodologies, free access to New Zealand-specific tools and software, and comprehensive training on any new methodology across the wider sector. For engineers in particular, the lack of a robust simple carbon measurement system to act as a 'single source of truth' was seen as a key barrier to enabling change.

### **Cost, measurement gaps, and a lack of awareness and demand could be barriers to change**

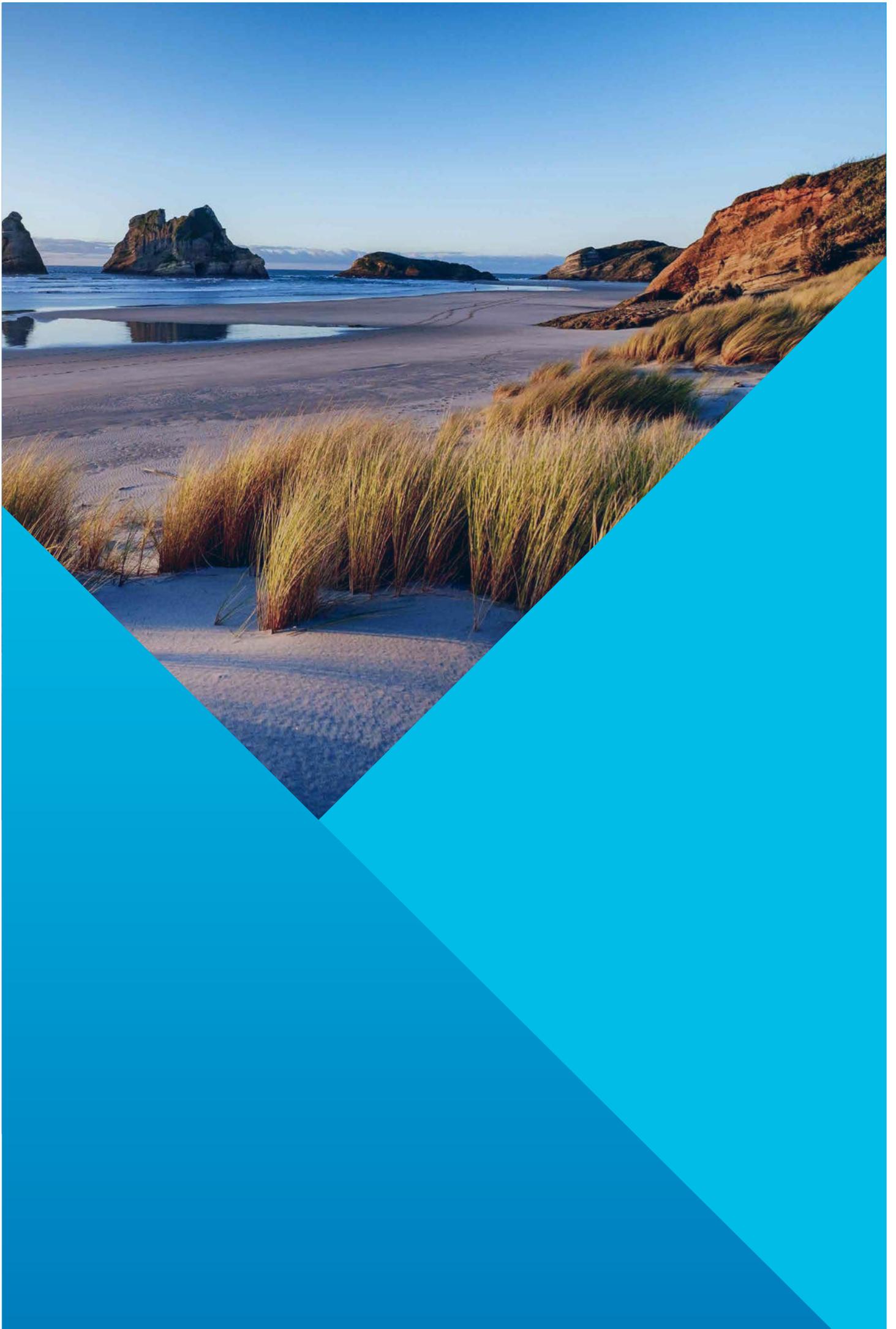
Submissions from this group suggested that there are a range of barriers, including cost concerns by industry and consumers, building standards with low minimums, limited choice of suitable materials, and the need for simple compliance pathways.

A number of respondents highlighted the need to consider how the broader system could support the sector's transition. Engineers emphasised the need to educate and incentivise improvements to building lifespan, reusability and the use of low-carbon materials.

**A range of regulatory and compliance mechanisms were suggested**

This stakeholder group broadly saw the government's role as creating a supportive regulatory environment that enables a move to a low-carbon economy.

The engineers in this group suggested government take a leading role in procurement and building practices to expand the supply chain of low impact materials into New Zealand. Others suggested a range of monitoring and compliance mechanisms including third-party certification processes, regular and ongoing monitoring by government agencies, and market-driven alternatives across different building stages to encourage good performance.



## 7. Future action

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This initial consultation is just the beginning of MBIE's work to ensure the building system can do its part to respond to climate change. MBIE recognises the Building for Climate Change programme is complex and could lead to significant changes for much of the sector. This means we need to take the time and work with homeowners and people within the building and construction sector to get this right.

MBIE will use the feedback received to further develop the Building for Climate Change programme, and to refine the technical methodologies for the two emissions mitigation frameworks. Targeted industry engagement in mid-2021 will seek detailed technical feedback on revised versions of the framework methodologies.

As part of the broader Building for Climate Change programme, MBIE is working to identify an appropriate pathway to introduce the final emissions mitigation frameworks into the building regulatory system. This will ensure they set transparent but mandatory requirements that can be understood across the whole system. We are also seeking to develop non-regulatory supports, guidance and information in order to successfully implement the frameworks while minimising unintended disruption to the sector.

In addition to the emissions mitigation frameworks, a third Building for Climate Change framework is also being progressed. This will ensure buildings and communities can adapt to the impacts of climate change – impacts such as sea level rise and more frequent extreme weather events. This work is contributing to the cross-agency National Adaptation Plan and will undergo consultation as part of that broader process.

Over the course of 2021, MBIE will refine the frameworks, assess options for how and when to implement them, and develop a package of policy interventions to enable and support them. Cabinet agreement to a public consultation on the full package of measures will be sought in early 2022.

The Building for Climate Change programme team looks forward to working with the sector to rise to our shared challenge and achieve a low carbon building and construction sector for New Zealand.



# Appendix A: Consultation questions

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## Submission Form

### BfCC

#### 1. Contact details (optional)

Name: \_\_\_\_\_

Company/organisation: \_\_\_\_\_

Email address: \_\_\_\_\_

#### 2. Are you making this submission on behalf of a business or organisation?

No

Yes (please tell us which Company/Organisation you are making this submission on behalf of)

\_\_\_\_\_

#### 3. Would you like to:

Remain anonymous in the published consultation summary report  No  Yes

Receive a copy of your own submission  No  Yes

Receive future updates on BfCC programme  No  Yes

#### 4. Are you willing to be contacted in relation to your submission if MBIE has questions about your response?

No  Yes

#### 5. The best way to describe your role is:

Architect  Building owner  Geotechnical Engineer

Building Consent Authority/Officer  Electrician  Structural Engineer

Builder  Engineer – other  Fire Engineer

Plumber/Gasfitter/Drainlayer  Building product/material supplier

Other

**To submit this form via email:**

Once you have completed the form, you can email it to [BfCC@mbie.govt.nz](mailto:BfCC@mbie.govt.nz), with "Submission" in the subject line.

**To submit a print copy of this form:**

You can post or courier your submission to:

**Via Courier:**

Building System Performance  
Ministry of Business, Innovation  
and Employment  
BfCC Submission  
15 Stout Street,  
Wellington 6011

**Via Post:**

Building System Performance  
Ministry of Business, Innovation  
and Employment  
BfCC Submission  
PO Box 1473  
Wellington 6140

## Overarching approach of the BfCC programme

**6. Do you agree or disagree that the Building and Construction Sector needs to take action to reduce emissions?**

Strongly disagree    Disagree    Neither    Agree    Strongly agree

Please tell us why.

**7. What support do you think you or your business would need to deliver the changes proposed in the frameworks?**

**8. Are there any barriers that are currently preventing (or discouraging) you, or your business, taking action to reduce emissions?**

No    Yes

Please identify the main challenges.

**9. Do you think the BfCC work programme should include the following building classifications?**

	No	Yes
Housing	<input type="checkbox"/>	<input type="checkbox"/>
Communal Residential	<input type="checkbox"/>	<input type="checkbox"/>
Communal Non-Residential	<input type="checkbox"/>	<input type="checkbox"/>
Commercial	<input type="checkbox"/>	<input type="checkbox"/>
Industrial	<input type="checkbox"/>	<input type="checkbox"/>

If you have indicated that you believe one, or more, building classifications should not be included, please tell us why:

## Framework: Transforming Operational Efficiency

**10. Do you agree or disagree that the BfCC work programme should include measures to improve the operational efficiency of buildings in New Zealand?**

Strongly disagree  Disagree  Neither  Agree  Strongly agree

Please tell us why.

**11. The Framework proposes that operational efficiency requirements tighten in a series of steps to reduce emissions in the Building and Construction Sector, with the requirements for each step published at the outset and the final step being reached by 2035.**

Do you support a gradual introduction of operational efficiency requirements, using a stepped approach?

No  Yes

**12. Do you think the timeframe is appropriate?**

Yes  No, it's too short  No, it's too long

Please tell us your ideal timeframe if it's not by 2035.

**13. The Framework proposes that a number of building types will be exempt from operational emission reduction requirements.**

Do you agree or disagree with the proposal to exclude the following from operational efficiency emission reduction requirements?

	No	Yes
Outbuildings	<input type="checkbox"/>	<input type="checkbox"/>
Ancillary buildings	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us why.

## Approach

**14. The Framework proposes that operational efficiency requirements will only apply to new buildings initially with further work to look at requirements for existing buildings being undertaken at a later date.**

Do you support this approach?

No  Yes

Please tell us why.

15. Do you support a limit on emissions from fossil fuel combustion to operate buildings (e.g. for space and water heating)?

No  Yes

Please tell us why.

16. Do you think that new Thermal Performance requirements based on heating and cooling demand should be introduced to support increased operational efficiency of buildings?

No  Yes

Please tell us why.

17. Detailed requirements for the efficiency of fixed services (such as heating and cooling systems, artificial lighting, hot water systems and appliances, ventilation systems etc) are not currently set out in the Building Code.

Do you think that Services Efficiency performance requirements should be introduced to support increased operational efficiency of buildings?

No  Yes

Please tell us why.

18. The framework proposes that there are requirements for the plug loads for large buildings\*, but not small buildings. Do you support this approach? (\*Large and small buildings as defined in the framework scope section)

No  Yes

Please tell us why.

**19. The Framework proposes that new buildings will not be required to include onsite renewable energy generation or energy storage capacity. Do you agree or disagree with this proposal?**

- Strongly disagree  
  Disagree  
  Neither  
  Agree  
  Strongly agree

Please tell us why.

**20. The Framework currently proposes to exclude the following elements from the BfCC work programme. Which do you think should be included or excluded?**

	Should be included	Should be excluded
Electrical appliance efficiency	<input type="checkbox"/>	<input type="checkbox"/>
On-site collection and storage of water	<input type="checkbox"/>	<input type="checkbox"/>
On-site waste water treatment	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us why.

**21. Buildings need to provide suitable indoor environmental quality (IEQ) for good occupant health and wellbeing outcomes. The Framework identifies the following critical IEQ parameters:**

- › Air temperature
- › Relative or absolute humidity
- › Ventilation rates
- › Surface temperature
- › Hygienic surface temperature (avoidance of mould)
- › Daylight provision

If there are any additional elements that you think should be considered, please record them in the comment box below.

22. The Framework proposes that the Thermal Performance energy use intensity and services energy use intensity are considered during the consent application process, and when a Code Compliance Certificate is applied for.

Do you think this would impact you or your business/organisation?

No  Yes

Please tell us why.

23. If there are any additional tools or support that you think you would need to implement this requirement, please tell us in the comment box below.

## Framework: Whole-of-Life Embodied Carbon Emissions Reduction

24. Do you agree or disagree that the BfCC work programme should include initiatives to reduce whole-of-life embodied carbon in New Zealand buildings?

Strongly disagree  Disagree  Neither  Agree  Strongly agree

Please tell us why.

**To meet our emission reduction goals, a key objective of the framework is to increase building material efficiency, and reduce construction waste.**

25. What measures, if any, do you think should be put in place to increase building material efficiency? (Select all that apply)

- › Update regulatory performance requirements to ensure they are appropriate
- › Incentivise 'lean design'
- › Remove barriers to the reuse of construction materials
- › Other (please specify)

**26. What measures, if any, do you think should be put in place to reduce construction waste?**

**27. Using low carbon construction materials and products is identified as another option to reduce whole-of-life embodied carbon emissions.**

How could we encourage the use of low carbon construction materials?

**The Framework proposes introducing reporting requirements for whole-of-life embodied carbon in buildings, followed by a cap on whole-of-life embodied carbon for new building projects.**

**28. Would you support a cap on whole-of-life embodied carbon for new building projects?**

No  Yes

Please tell us why.

**29. Do you think a data repository of embodied carbon from buildings should be established?**

No  Yes

Please tell us why.

**30. If a data repository was established, do you think this information should be able to be accessed by the public?**

No  Yes

Please tell us why.

**31. Which, if any, of the following factors would make it difficult for people to report the whole-of-life embodied carbon of new buildings, and why?**

- Lack of an agreed methodology  Inadequate data quality and availability
- Lack of appropriate tools or software  Administrative burden on businesses
- Other (please specify):

**32. What support, if any, do you think will be needed to make reporting embodied carbon a standard part of the design and construction process for every new building project in New Zealand?**

The framework proposes that reporting of whole-of-life embodied carbon for buildings would be carried out as part of the building consent application process.

**33. What impact do you think this proposal will have on the Building and Construction sector?**

**34. What additional tools or support would be needed to implement this requirement?**

**35. Do you think that requirements for embodied carbon calculations should only include the initial building life cycle stages (product and construction stage)?**

- No  Yes

Please tell us why.

**36. The Framework proposes limiting the type of building components that would be included in an embodied carbon assessment, excluding components with lower emissions (such as internal fittings).**

**Do you agree with this proposal?**

No  Yes

Please tell us why.

**37. Do you think that reporting on, and ultimately capping, embodied carbon should apply to new building projects only, not refurbishment or demolition projects?**

No  Yes

Please tell us why.

**38. The Framework proposes that a simplified embodied carbon calculation tool could be used for small buildings but more detailed calculations would need to be provided for large buildings\*.**

*(\* Large and small buildings as defined in the framework scope section)*

**Do you agree with this proposal?**

No  Yes

Please tell us why.

**39. Any other comments on the proposed frameworks?**

# Appendix B: Quantitative summary of submissions

This section presents the results of quantitative consultation questions. Not all questions were quantifiable.

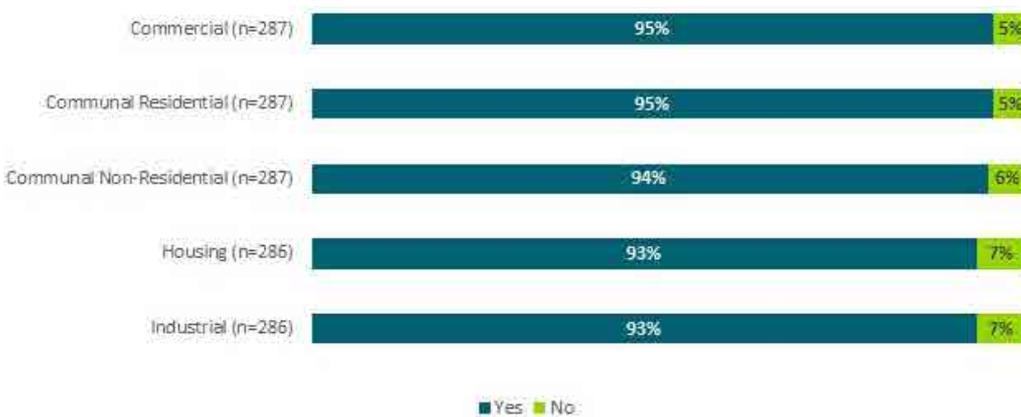
6. Do you agree or disagree that the Building and Construction Sector needs to take action to reduce emissions?



8. Are there any barriers that are currently preventing (or discouraging) you, or your business, taking action to reduce emissions?



9. Do you think the BfCC work programme should include the following building classifications: housing, communal residential, communal non-residential, commercial, and industrial?



10. Do you agree or disagree that the BfCC work programme should include measures to improve the operational efficiency of buildings in New Zealand?



11. The Framework proposes that operational efficiency requirements tighten in a series of steps to reduce emissions in the Building and Construction Sector, with the requirements for each step published at the outset and the final step being reached by 2035. Do you support the gradual introduction of operational efficiency requirements, using a stepped approach?



12. Do you think the timeframe is appropriate?



14. The Framework proposes that operational efficiency requirements will only apply to new buildings initially with further work to look at requirements for existing buildings being undertaken at a later date. Do you support this approach?



15. Do you support a limit on emissions from fossil fuel combustion to operate buildings (e.g. for space and water heating)?



16. Do you think that the new Thermal Performance requirements based on heating and cooling demand should be introduced to support increased operational efficiency of buildings?



17. Detailed requirements for the efficiency of fixed services (such as heating and cooling systems, artificial lighting, hot water systems and appliances, ventilation systems, etc.) are not currently set out in the Building Code. Do you think that Services Efficiency performance requirements should be introduced to support increased operational efficiency of buildings?



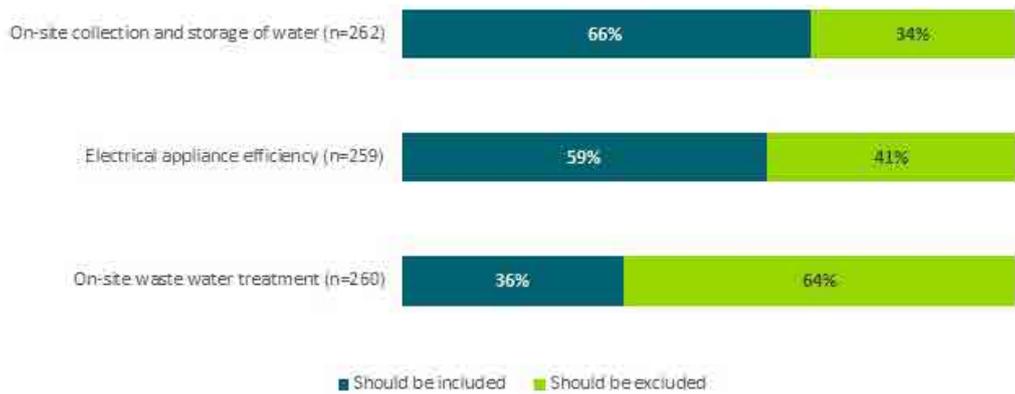
18. The Framework proposes that there are requirements for the plug loads for large buildings, but not small buildings. Do you support this approach?



19. The Framework proposes that new buildings will not be required to include onsite renewable energy generation or energy storage capacity. Do you agree or disagree with this proposal?



20. The Framework currently proposes to exclude the following elements from the BfCC work programme. Which do you think should be included or excluded? Electrical appliance efficiency, On-site collection and storage of water, On-site waste water treatment.



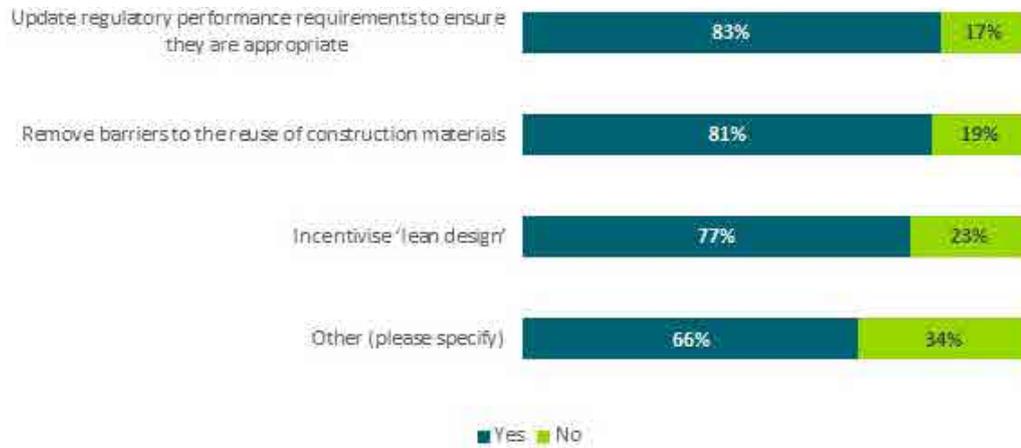
22. The Framework proposes that the Thermal Performance energy use intensity and services energy use intensity are considered during the consent application process, and when a Code Compliance Certificate is applied for. Do you think this would impact you or your business/organisation?



24. Do you agree or disagree that the BfCC work programme should include initiatives to reduce whole-of-life embodied carbon in New Zealand buildings?



25. What measures, if any, do you think should be put in place to increase building material efficiency?



28. Would you support a cap on whole-of-life embodied carbon for new building projects?



29. Do you think a data repository of embodied carbon from buildings should be established?



30. If a data repository was established, do you think this information should be able to be accessed by the public?



31. Which, if any, of the following factors would make it difficult for people to report the whole-of-life embodied carbon of new buildings, and why?



35. Do you think that requirements for embodied carbon calculations should only include the initial building life cycle stages (product and construction stage)?



36. The Framework proposes limiting the type of building components that would be included in an embodied carbon assessment, excluding components with lower emissions (such as internal fittings). Do you agree with this proposal?



37. Do you think that reporting on, and ultimately capping, embodied carbon should apply to new building projects only, not refurbishment or demolition projects?



38. The Framework proposes that a simplified embodied carbon calculation tool could be used for small buildings but more detailed calculations would need to be provided for large buildings. Do you agree with this proposal?





**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT**  
HĪKINA WHAKATUTUKI

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