



NEW ZEALAND
GOVERNMENT PROCUREMENT

Procurement guide to reducing carbon emissions in building and construction

A practical guide



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
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Procurement guide to reducing carbon emissions in building and construction

A practical guide to understanding upcoming changes in the building and construction sector and the steps you can take in procuring new building and construction projects.

What this guide is for

This guide is intended to help people involved in the procurement of building and construction projects understand how they can influence change in reducing carbon emissions.

It is intended to complement MBIE's construction procurement guidelines for improving sustainability, and aligns with construction procurement guidelines:

- Sustainable Construction
- Construction Project Governance
- Project Brief
- Whole-of-life.

A number of government agencies, construction organisations, and industry representatives of the Construction Sector Accord have contributed to and provided feedback in the development of this guide.

NOTE: This is not a technical document. It does not attempt to set out a methodology or standard for carbon measurements, and is not intended to provide guidance on product selection.

[Construction Sector Accord](#)
[Construction Procurement Guidelines](#)

This guide is a first step towards supporting government agencies to lead the way in reducing carbon emissions generated by the construction of new government buildings. Further work is underway within MBIE to establish oversight arrangements that will ensure government is achieving this goal. This includes greater Ministerial visibility and oversight on decision-making, and ways of accelerating learning through sharing of best practice. This guide will be updated as further decisions on these arrangements are made.

Who this guide is for

As a major procurer of building and construction projects, government agencies have a significant influence in effecting change to reduce carbon emissions. They define project objectives, develop the Project Brief, specify the requirements of suppliers, and assess suppliers through tender selection processes. However, this guide is not limited to government agencies.

Organisations in the private sector will also find it useful as the potential changes within MBIE's Building for Climate Change Programme will apply to all new building and construction projects. The supplier market can also use it when responding to future tender opportunities (e.g. design consultants bidding for design services).

Background

Government has signalled a clear commitment to reduce carbon emissions and have proposed changes to the regulatory framework in the building and construction sector.

The building and construction sector is a large contributor to greenhouse gas emissions from producing materials, constructing buildings, and the energy used in buildings and must play a major part if New Zealand is to reach its climate change goals, including Net Zero Carbon by 2050.

MBIE's Building for Climate Change Programme

The Building for Climate Change Programme has been set up to drive transformational change in the sector to meet the challenges posed by climate change, and to meet our targets to be a net zero emissions nation by 2050. The programme is focused around two frameworks that will work together to:

- Improve the operational efficiency of buildings which will reduce energy and water use, and improve ventilation and indoor environmental qualities of buildings. Improved efficiency will lead to lower operational emissions, also known as operational carbon, from buildings.
- Reduce the whole of life embodied carbon of buildings which includes greenhouse gas emissions generated from:
 - production of construction materials;
 - construction process;
 - construction waste disposal; and
 - disposal at the end of a building's life.

NOTE: The proposals being considered under the programme are still very much under development, but there may be specific reporting requirements and caps which new building projects must meet as part of securing a building consent or code compliance certificate.

[Building for Climate Change Programme](#)

Carbon Neutral Government Programme

The Carbon Neutral Government Programme is a long-term work programme that aims to make a number of government organisations carbon neutral by 2025 to help them reduce emissions. The programme requires Departments, Departmental Agencies and Non-Public Service Departments, Crown Agents, the Reserve Bank of New Zealand, Offices of Parliament, and tertiary institutions (including the New Zealand Institute of Skills and Technology (NZIST)) to:

- measure, verify and report their emissions annually
- set gross emissions reductions targets and longer-term reduction plans for the next decade
- introduce a phased work programme to reduce organisations' emissions
- offset after gross emissions reductions are made to achieve carbon neutrality.

[Carbon Neutral Government Programme](#)

Transitioning to a net zero emissions economy

The Government Procurement Rules also support the Government's goal of transitioning to a net zero emissions economy by 2050, and significantly reducing waste by 2020.

Agencies are encouraged to support the achievement of positive environmental outcomes through sustainable procurement by buying low emissions and low waste goods, services and works. It is a mandatory requirement for some contracts (known as designated contracts) to report performance in this area.

[Broader outcomes](#)

Whole of life embodied carbon and operational carbon

The greatest opportunities to reduce whole of life embodied carbon and operational carbon are at the planning and design phases of a project.

At the beginning phase of identifying a business need, you can significantly reduce carbon by considering other options that do not result in a new building. For example, consider other options at the business case stage, such as:

- improving how an existing space is used;
- changing ways of working;
- refurbishing an existing building to enhance its usability;
- or leasing instead of building.

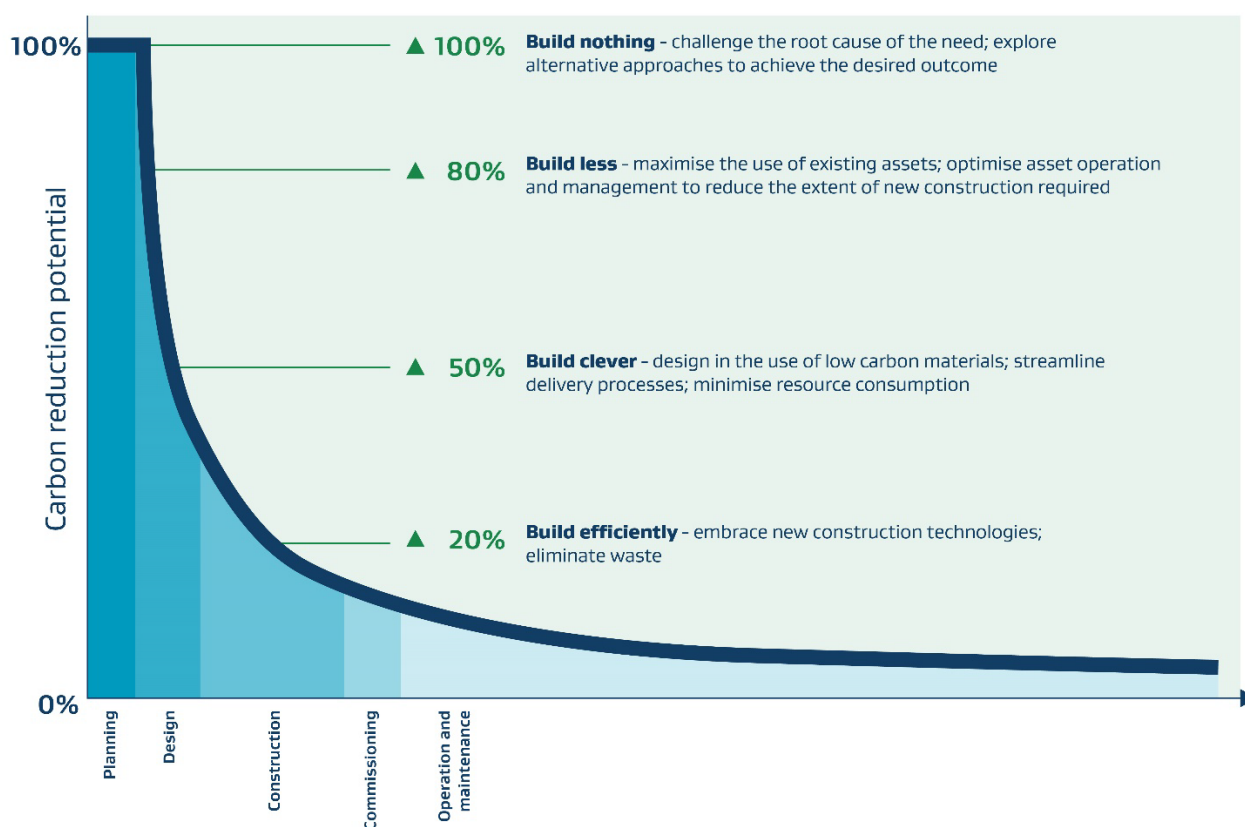


Figure 1. Carbon reduction potential over time and illustrative relative savings of decisions to build (Green construction Board after HM Treasury, Infrastructure Carbon Review, (Nov 2013))

According to the American Institute of Architects, renovation and reuse projects can save between 50 and 75 percent of the whole of life embodied carbon when compared to commissioning a new build, especially when the existing foundations and structure are re-used (where most of the whole of life embodied carbon is fixed).

The relationship between whole of life embodied carbon and operational carbon over time

The focus on reducing the environmental impact of buildings has been mainly focused on increasing operational efficiency. However, there is a growing interest in reducing whole of life embodied carbon, both in New Zealand and globally. This is due to the increasing scrutiny of the carbon emissions generated from building materials and products, not just the operation of buildings, and the realisation that over time new buildings will become more efficient in use through improved design and technology, thereby increasing the significance of whole of life embodied carbon.

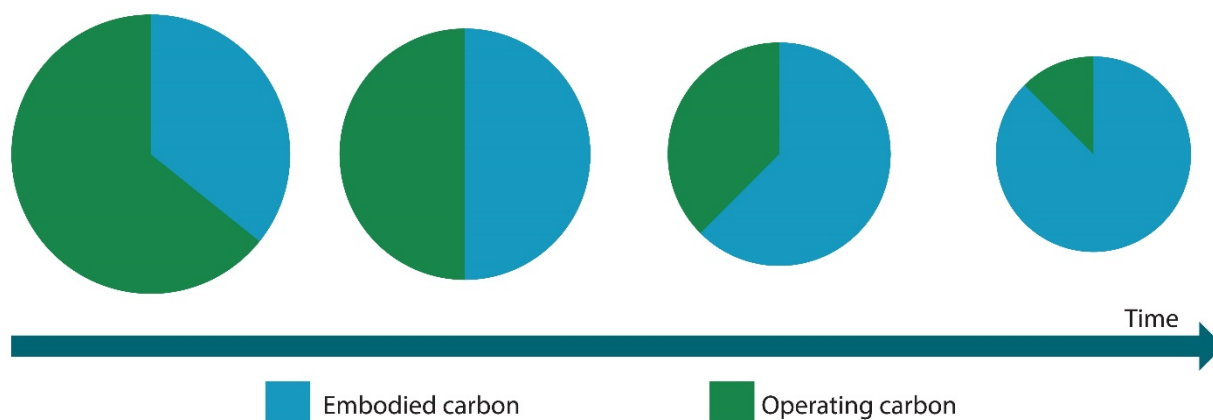


Figure 2. As operational carbon reduces with improved efficiency in new buildings, whole of life embodied carbon will become more significant.

Where carbon emissions relate to the building lifecycle

Whole of life embodied carbon is largely determined by the time a building or construction project arrives at the construction stage through key design decisions made on the systems and materials to be used. It includes embodied carbon generated through life cycle replacement of materials like windows or doors, as well as the disposal of a building at the end of its life (e.g. demolition). The opportunity to significantly reduce embodied carbon will be influenced by the choices made during the initial design stages. Because whole of life embodied carbon is not subject to how the building is used we can predict these emissions more accurately.

Operational carbon relates to emissions occurring when the building is in use like energy and water usage. Good design and effective management and monitoring is necessary for efficient energy and water usage.

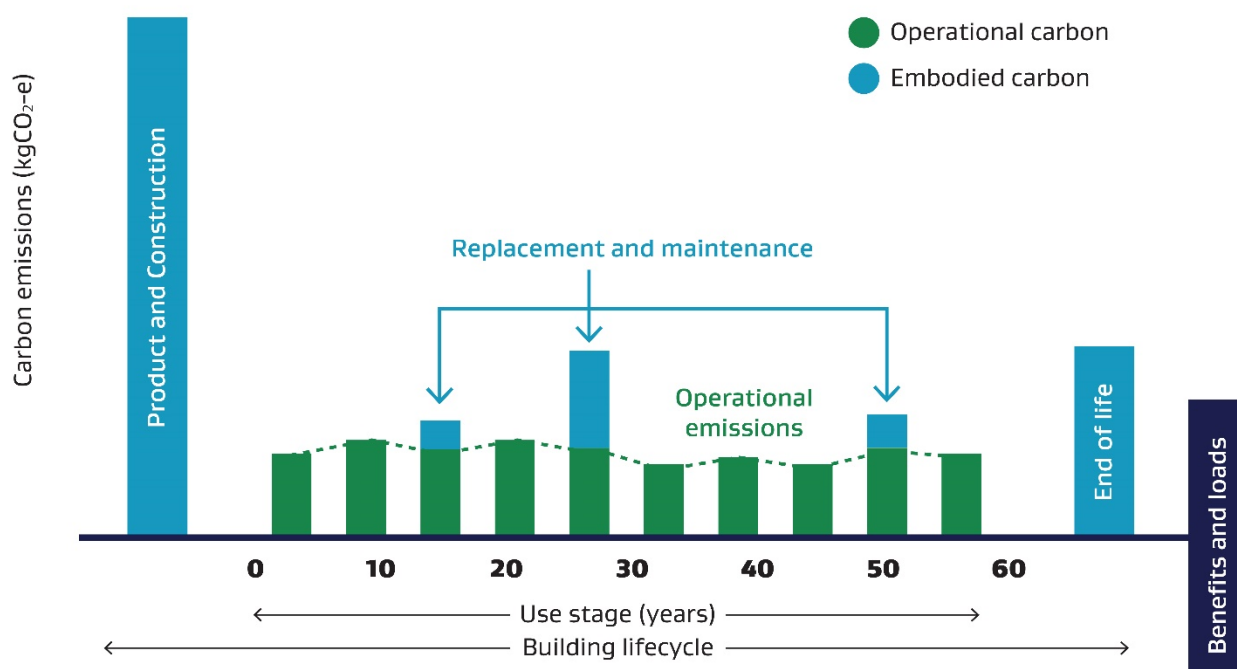


Figure 3. How embodied carbon and operational carbon relate over the building lifecycle

Where to begin

Prioritise the key areas that will require the least effort to deliver the biggest savings:

- For whole of life embodied carbon, take a stepped approach to life cycle assessment, and the components of a building that will deliver the biggest savings in the planning and design stages (see below).
- For operational carbon, you should adopt the proposed caps set out in the “Transforming Operational Efficiency” framework, which was consulted on in August 2020, through the Building for Climate Change Programme and utilize predictive energy modelling in the design phase.
- Develop a Carbon Brief as part of the Project Brief (see below). This will identify key priority areas for you and your project team, and set out the agreed approach and targets for reducing whole of life embodied carbon and operational carbon.

Life Cycle Assessment

A Life Cycle Assessment (LCA) approach is typically used to calculate the whole of life embodied carbon of a project. Here are the life cycle stages to be considered when assessing the whole of life embodied carbon of a project. When considering embodied carbon, a full life cycle view should be taken into account. However, when more life cycle stages are included, the modelling process becomes more complex and requires greater effort due to increased requirements for data and assumptions.

The initial stages (A1-A5) represent emissions banked following construction, with later stages (B, C, D) representing estimates of potential future emissions.

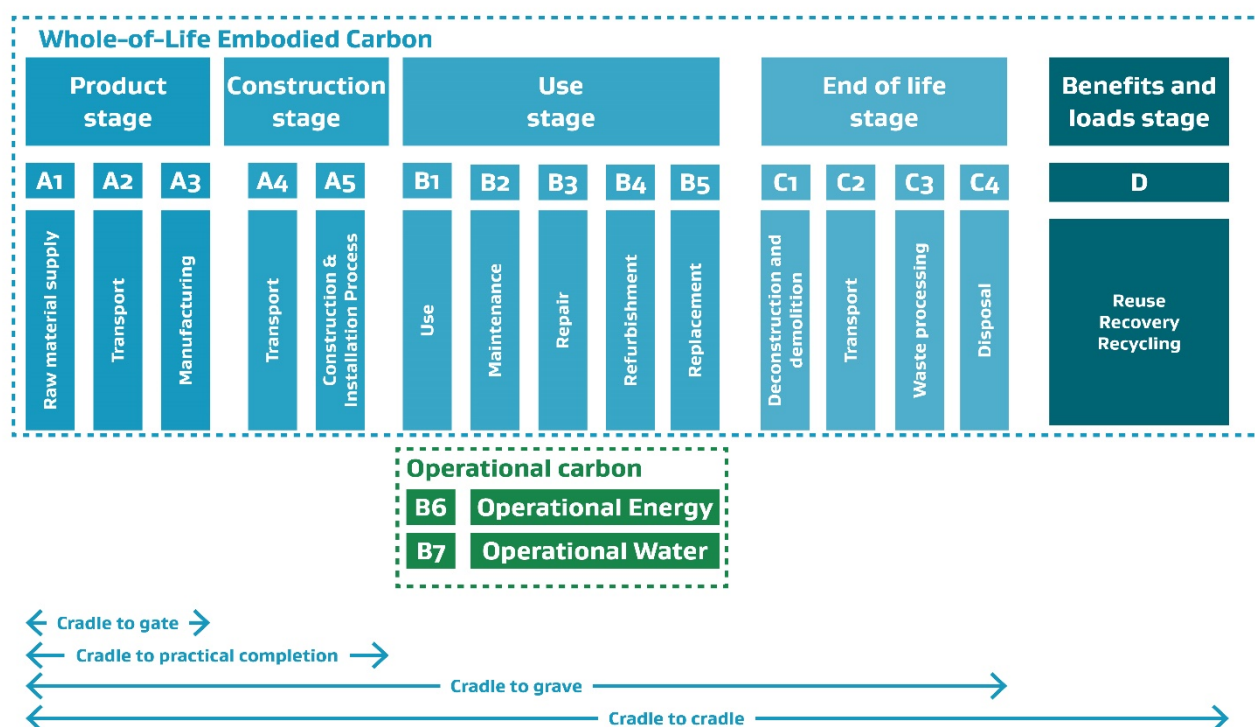


Figure 4. The module framework set out in international standards for LCA, outlining how embodied carbon and operational carbon relate over the building lifecycle

TIP: When considering the opportunities that are available to reduce embodied carbon, it is important to consider the potential impacts of materials once a building has reached the end of its useful life, to provide a whole of life view. Designing for re-use and recycling, rather than disposal, can help to further reduce the embodied carbon impacts of materials by minimising future waste.

Focus areas for building components for reducing whole of life embodied carbon

A large part of the whole of life embodied carbon from a building project is captured in the structural frame, floors and foundations followed by the envelope and internal fittings. It can be useful to prioritise focus on the areas that will have the biggest impact.

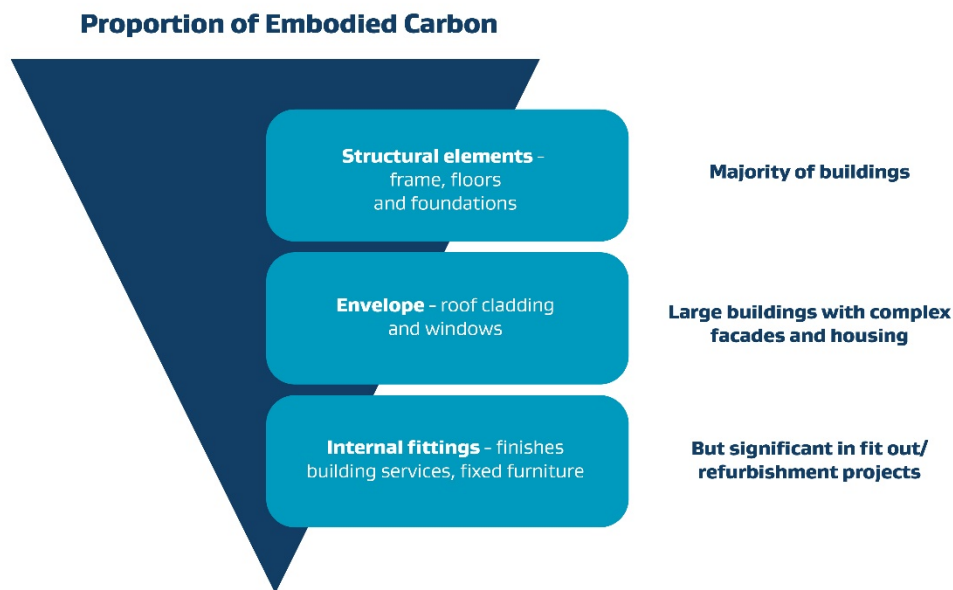


Figure 5. Relative impact of different components of a building on reducing whole of life embodied carbon for a new build project.

TIP: Technological developments in structural materials and components, such as engineered wood products, have provided opportunities to reduce the embodied carbon of structural systems, by substituting, either in whole or in part, the use of more traditional, high carbon materials.

Reducing whole of life embodied Carbon through on site activity

You can lower the whole of life embodied carbon from on-site construction activities through:

- good waste management;
- using local materials where possible to reduce transport emissions; and
- making use of off-site construction methods, reducing less efficient on-site activities and site waste.

TIP: While the biggest opportunities for savings lie in the design, best practice approaches by construction companies are important aspects to consider in the tender selection process.

Tools and data sources for assessment

There are standard tools available in the market, but some design consultants have developed their own to support them in adopting a sustainable approach to design. There are also a number of useful sources for embodied carbon data including BRANZ and the Australasian Environmental Product Declaration platform.

NOTE: The use of tools and data sources will ultimately need to align in future with the methodology developed and consulted on in 2021 through the Building for Climate Change Programme.

[BRANZ Data](#)

[EPD Australasia](#)

Rating systems

There are a number of points based rating systems that consider a wide range of factors to assess the overall environmental impact of a building. These systems typically allow building owners to select a mix of features that can contribute to a score or rating to demonstrate the overall performance. Some of these systems include components that can be used for assessing the whole of life embodied carbon or operational carbon generated for different options being considered for a project.

Specific tools

There are also tools available which have a more specific focus on calculating the carbon emissions, for whole of life embodied carbon or operational carbon. These tools can be broadly divided into two categories:

1. Energy modelling tools, which calculate the energy requirements of a specific building based on its physical characteristics.
2. Life Cycle Assessment (LCA) tools, which calculate embodied and operational carbon from the materials used (from a bill of quantities or cost plan) and total energy requirements (from an energy modelling tool).

The LCA Quick tool which is freely available from BRANZ can be used for calculating embodied carbon, and BRANZ offer free training for those not familiar with the tool. It is also worth noting that LCA Quick is compatible to be incorporated within other rating systems such as Green Star where these are adopted for a project.

System or tool	Type	Focus areas		
		Overall sustainability performance	Whole of life embodied carbon	Operational efficiency (Operational Carbon)
Green Star	Rating tool (non-residential)	✓	✓	✓
Homestar	Rating tool (residential)	✓	✓	✓
NABERSNZ	Rating tool (office buildings)			✓
Passive House	Energy Performance Standard			✓
Living Building Challenge (International Living Future Institute)	Rating tool	✓		
Zero Carbon Certification (International Living Future Institute)	Rating tool		✓	✓
eTool	LCA tool		✓	✓
LCAQuick	LCA tool		✓	✓
One Click LCA	LCA tool		✓	✓
EC3	LCA tool		✓	
Tally	LCA tool		✓	

System or tool	Type	Focus areas		
		Overall sustainability performance	Whole of life embodied carbon	Operational efficiency (Operational Carbon)
PHRibbon	LCA tool		✓	
EnergyPlus	Energy modelling tool			✓
IES	Energy modelling tool			✓
PHPP	Energy modelling tool			✓
Design Builder	Energy modelling tool			✓
AccuRateNZ	Energy modelling tool			✓

Table 1. Comparison of rating systems and tools available for assessing overall sustainability performance, whole of life embodied carbon, and operational carbon.

Table 1 is an informative guide to some of the different systems and tools available in the market and the areas that they specifically focus on. It is not intended to be an exhaustive list or an endorsement from MBIE on any particular system or tool. MBIE may update this guide in future to provide further guidance on the most appropriate system or tools to be used. In the meantime, advice on the most appropriate approach for a given project should be sought from technical experts familiar in this field.

Demonstrating how you are taking positive steps to reduce carbon emissions

When a mandated agency is designing and constructing a new building it is a requirement of this guide that agencies must adopt a three step approach throughout the design process.

Step 1 - Carbon Brief

Sets out the agencies' intent to maximise opportunities to reduce carbon emissions generated through the project and setting out the reporting requirements for the consultants during the design phase.

Step 2 - Assess

Assess and document at each relevant stage of the design process through the consultant team the relative impacts of each design option on the total carbon emissions generated for the project. The aim should be to identify the lowest possible carbon option available that can meet the requirements of the Project Brief.

Step 3 - Report

Decisions made relating to selection of design options must be documented by the agency. Where an agency decides to proceed with an option that is not the lowest possible carbon option available to meet the Project Brief, the report must identify the rationale and be signed off by the Chief Executive¹.

¹ Note: MBIE is undertaking further work on oversight arrangements to improve Ministerial visibility of decision-making that impacts on the carbon emissions profile of new government buildings. These requirements may change as a result of this work and the Guide will be updated accordingly.

TIP: identify both the negative and positive emissions (e.g. carbon stored in timber construction products), when assessing and reporting on the relative impacts of each design option considered.

Carbon Brief

A Carbon Brief describes how you will develop an effective approach to reducing whole of life embodied carbon and operational carbon through planning and design. It is a part of the Project Brief, and should be approved by the project sponsor(s) and Senior Responsible Officer to ensure commitment from the top.

A Carbon Brief should be used when going to market for consultant services as it includes minimum requirements focused on the areas where the biggest reductions will be available for the least effort. It also sets out the timing of reports required through the planning and design phase as well as the methods, tools and data to be used in preparing reports.

TIP: It is a good idea to link the timing of reports to the design stages specified within the NZ Construction Industry Council Guidelines as much of the consultant sector will be familiar with these.

[NZ Construction Industry Council Guidelines](#)

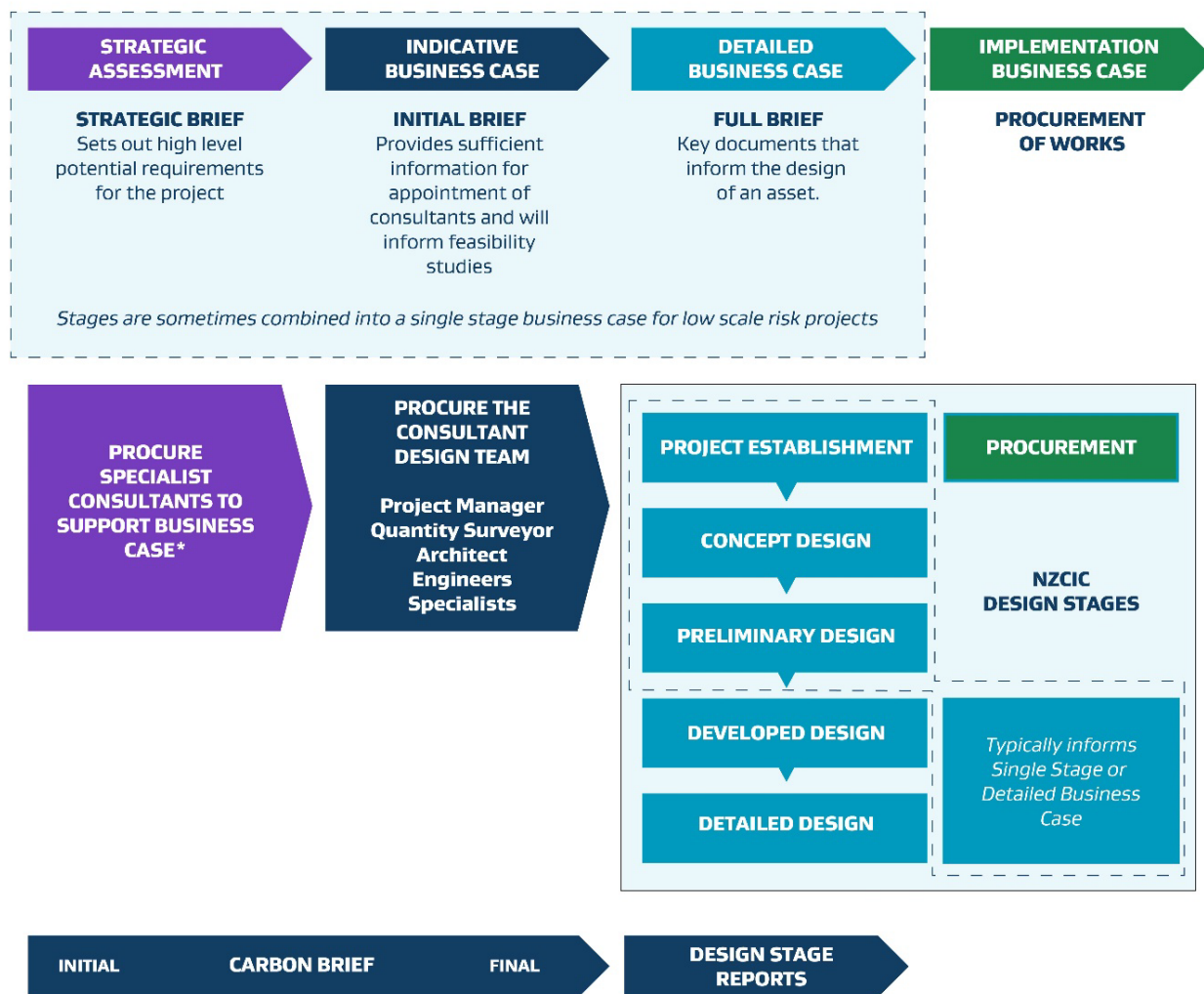
The example Carbon Brief gives consultants the opportunity to respond with innovative proposals to meet or go beyond the requirements as capability develops and data becomes more widely available. This can also be used as a key focus for evaluating proposals.

You can finalise the Carbon Brief to reflect accepted proposals and on-board the team with a focus on reducing carbon emissions during the design process.

TIP: For a project where the contractor is being asked to provide the design based on a brief provided by the client e.g. a design and build delivery model, the Carbon Brief would be issued to the contractor for them to bid back in much the same way as the consultants described above.

When to prepare a Carbon Brief

The best time to start is at the beginning phase of initiating a project, to set clear objectives so that the project team can respond accordingly with appropriate solutions, from developing the business case through to the development of design responses. Figure 6 is an illustrative model of how the Carbon Brief might relate to the various stages of the business case and design stages for a typical project.



* Large scale and or / high risk projects where there is not agency capability in house may require outsourced technical and commercial advisers to be appointed in advance of the design team to support the development of the business case

Figure 6. Illustrative model of relationship between Project Brief, Treasury's Better Business Case process, procurement of the consultant team, NZCIC design stages, and Carbon Brief.

Responsibilities within the team for reducing carbon impacts

Define who within the organisation procuring the building will be accountable for ensuring that the three-step approach to carbon reduction is applied throughout the planning and design phase, either the Senior Responsible Officer for the project or their delegate.

Determine who in the design consultant team will have the lead responsibility for modelling, assessing and reporting on carbon throughout the planning and design phase. Make sure they have appropriate authority to be involved in key design decisions so that carbon reporting drives early decision making rather than becoming an auditing tool.

Specialist expertise may be needed

In some instances, it may pay to bring in a dedicated consultant that is not involved in providing design services to provide specialist expertise:

- to provide a much more dedicated focus and drive to support the design team in improving their carbon literacy and achieving carbon reductions through the design process (this can be useful on larger or complex projects).
- you have a programme of work which could benefit from a specialist establishing a framework for modelling, assessing and reporting on carbon across the programme to capture data, lessons learned and opportunities for improvement (through improved design solutions and processes).
- you want to address concerns that only bigger design practices will have the capability needed which could exclude smaller design practices from winning work.

Where you wish to bundle services, to create a single point of responsibility, for example engineering design services with carbon modelling expertise, but want to avoid disadvantaging smaller design practices, you can also signal in tender documents that design consultants are permitted to sub-consult this expertise in to their team where required.

Thinking about carbon should be a priority for everyone involved in the building and the construction sector. Make sure that any specialist expertise is an integral part of the design team rather than an add-on, and make improving the project team's carbon literacy a key aspect of the relevant consultant service requirements.

Considerations for procuring the consultant team

- Identify who will act as the main lead consultant for measuring and reporting on carbon reduction through the design process, e.g. if you are targeting the foundations and structure you may want the Engineer to be the lead consultant
- Clarify in requests for proposals if sub-consulting expertise is permitted to augment the lead consultant's capabilities in carbon reduction measuring and reporting
- Set out requirements for the design consultant team to consider carbon reduction as a key criteria when evaluating design options in their respective discipline areas
- Where you decide to appoint dedicated specialist expertise in addition to the design consultant appointments make sure:
 - the design consultants have requirements in their scopes of services to work in full collaboration with the specialist consultant, so that the specialist consultant is an integral part of the design team rather than an add on
 - the design consultant's appointments require them to provide information to the specialist consultant and to consider a range of options that will reduce carbon impacts
 - include requirements in the specialist consultant's appointment for them to upskill the team's capabilities in measuring, reporting and reducing carbon impacts through good design
- Include evaluation criteria in requests for proposals that focus on a consultant's expertise in reducing whole of life embodied carbon and operational carbon through innovation in design.
- Include the Carbon Brief in Request for Proposals and ask consultants to respond with their proposed methodology and approach to meeting and exceeding requirements.
- Select consultants that have a track record in reducing whole of life embodied carbon and operational carbon through good design, and request previous examples from previous design and construction projects.
- Use the Carbon Brief to build effective relationships with your project team including project manager, quantity surveyor, architects, engineers, designers, contractors, and sub-contractors and suppliers to build and align a common understanding of your vision and goals.
- Allow your design team the freedom to innovate to meet the objectives of the Carbon Brief.