



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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Contents

Contents	3
Procurement guide to reducing carbon emissions in building and construction	4
What this guide is for	4
Who this guide is for	4
Background	5
MBIE’s Building for Climate Change Programme	5
Carbon Neutral Government Programme	5
Transitioning to a net zero emissions economy	5
Whole of life embodied carbon and operational carbon	6
The relationship between whole of life embodied carbon and operational carbon over time	7
Where carbon emissions relate to the building lifecycle.....	7
Where to begin	8
Life Cycle Assessment	8
Focus areas for building components for reducing whole of life embodied carbon	9
Reducing whole of life embodied Carbon through on site activity	10
Data sources for assessment	10
Tools with a specific focus on calculating carbon emissions	11
Demonstrating how you are taking positive steps to reduce carbon emissions	11
Carbon Brief	12
Responsibilities within the team for reducing carbon impacts	13
Specialist expertise may be needed.....	14
Considerations for procuring the consultant team	14
Requirement to use an approved sustainable building rating system for new non-residential buildings.....	15
Approved rating tools	15
Framework to enable rating tools to be assessed and approved.....	15
Additional considerations for procuring the consultant team when using an approved rating system	16

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.

[Construction Procurement Guidelines](#)

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.

[Construction Sector Accord](#)

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.

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.

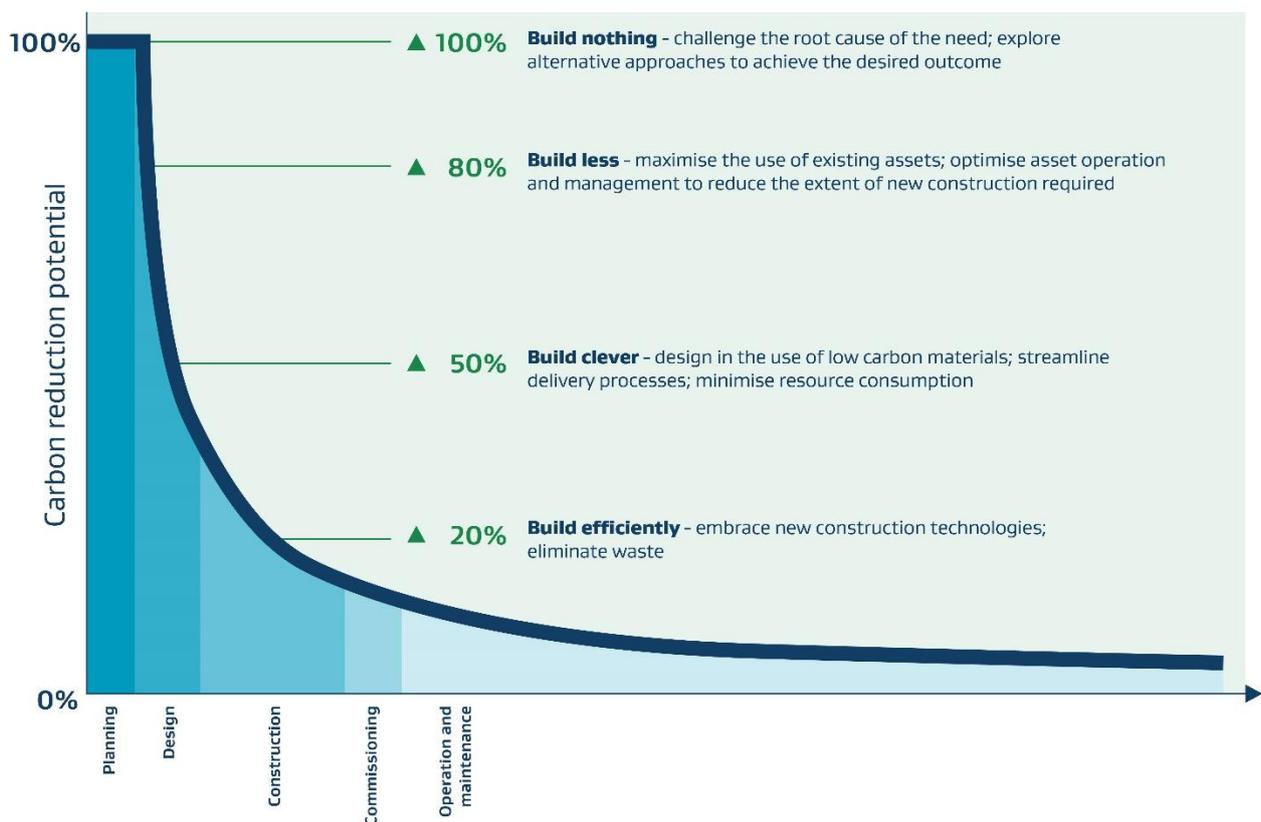


Figure 1. Carbon reduction potential over time and illustrative relative savings of decisions to build (Green construction Board after HM Treasury, Infrastructure Carbon Review, (Nov 2013))

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.

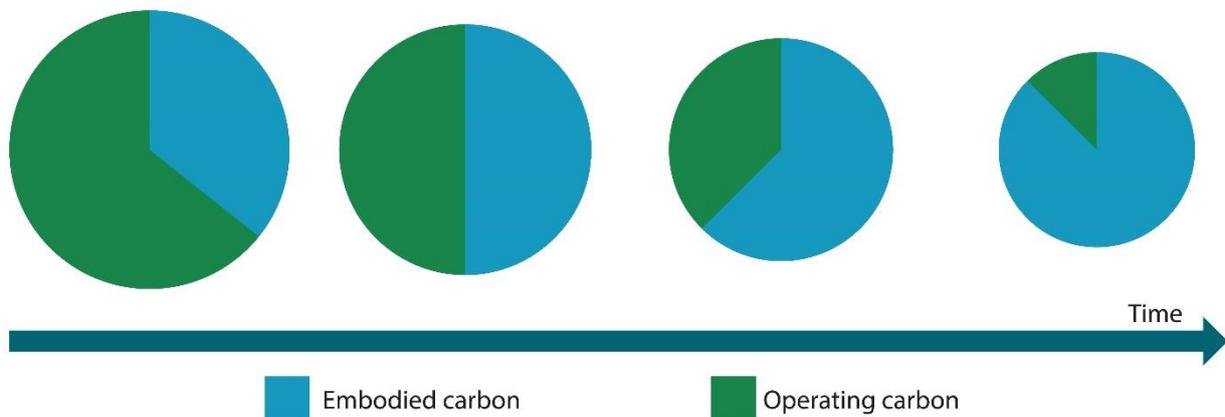


Figure 2. As operational carbon reduces with improved efficiency in new buildings, whole of life embodied carbon will become more significant.

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.

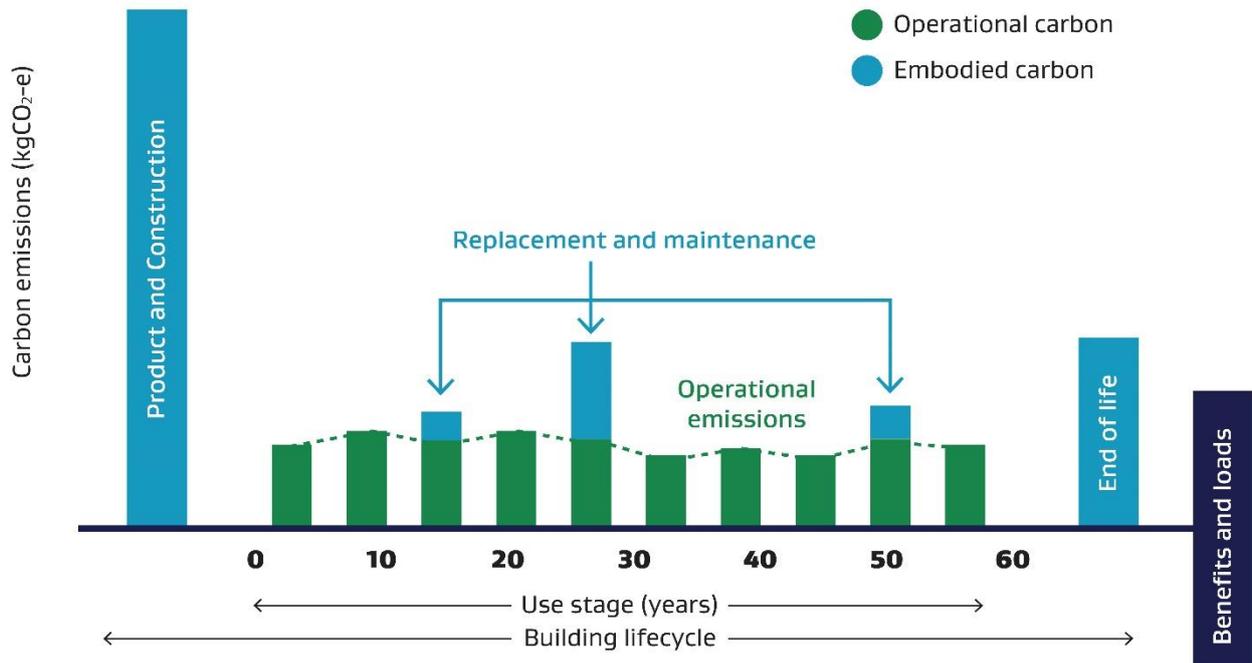


Figure 3. How embodied carbon and operational carbon relate over the building lifecycle

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.

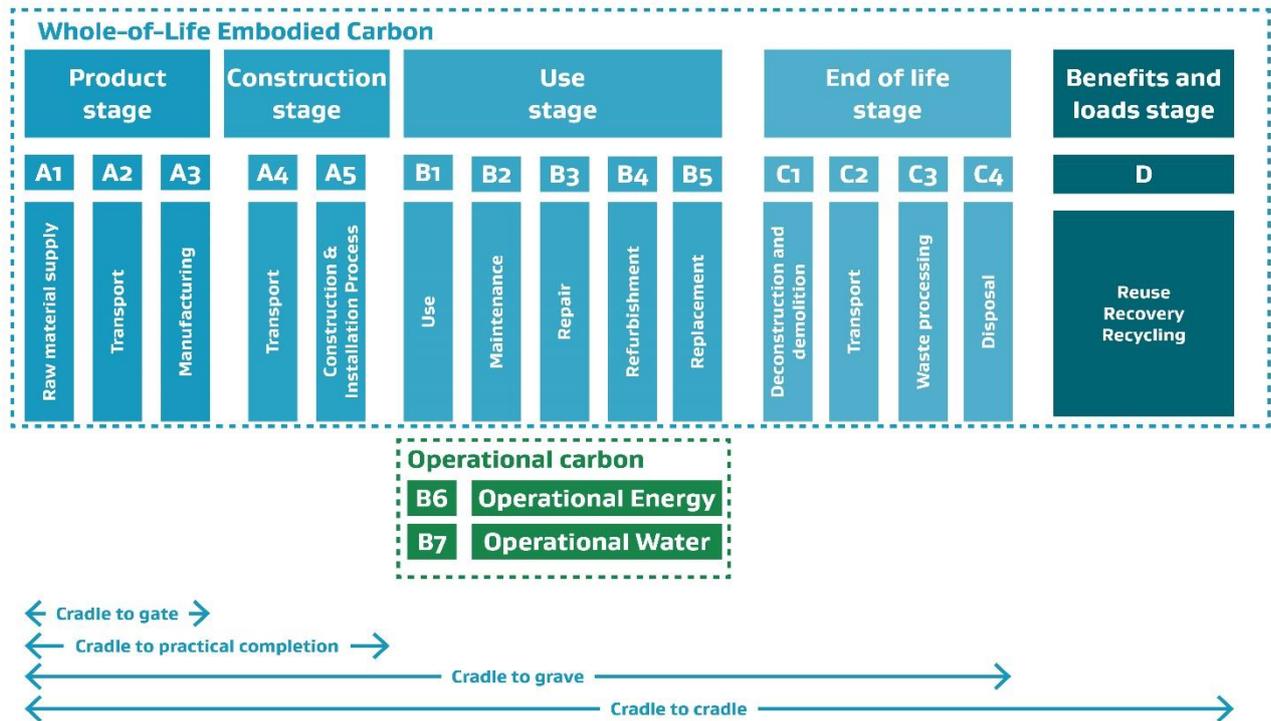


Figure 4. The module framework set out in international standards for LCA, outlining how embodied carbon and operational carbon relate over the building lifecycle

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.

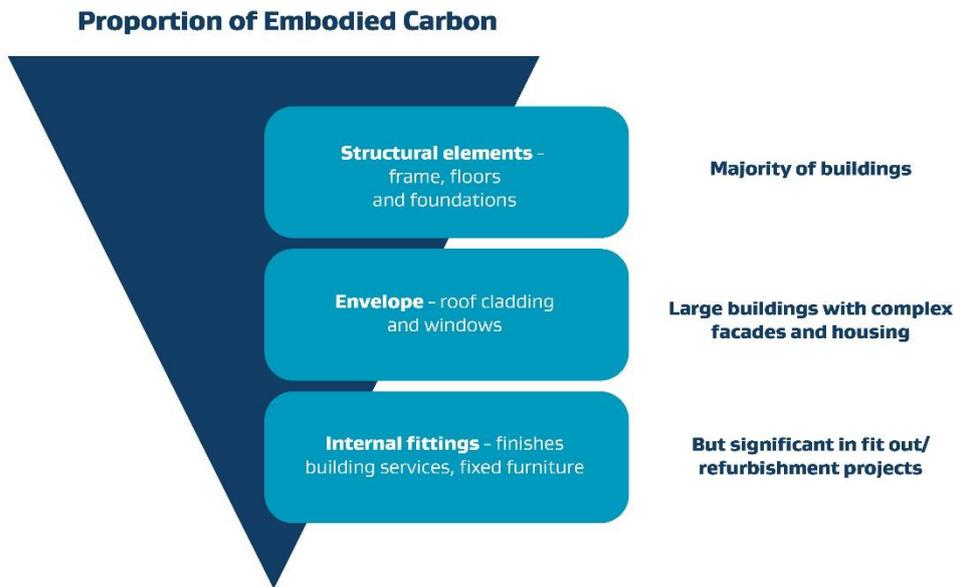


Figure 5. Relative impact of different components of a building on reducing whole of life embodied carbon for a new build project.

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.

Data sources for assessment

There are a number of useful sources for embodied carbon data including BRANZ and the Australasian Environmental Product Declaration platform.

NOTE: The use of 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](#)

Tools with a specific focus on calculating carbon emissions

If you are not subject to the requirement to use an approved sustainable rating building system, there are tools available which have a 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 some other rating systems such as Green Star.

Tool	Type	Focus areas	
		Whole of life embodied carbon	Operational efficiency (Operational Carbon)
eTool	LCA tool	✓	✓
LCAQuick	LCA tool	✓	✓
One Click LCA	LCA tool	✓	✓
EC3	LCA tool	✓	
Tally	LCA tool	✓	
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 tools available for assessing, whole of life embodied carbon, and operational carbon.

Table 1 is an informative guide to some of the different 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 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.

Note: where an agency is meeting the requirement to achieve a 5-star Green Star rating including the minimum point's requirement, or is meeting the requirements of another approved rating system, the agency will be deemed to have selected the lowest carbon option.

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 Executive
- the Detailed Business Case must set out the reasons why the lowest carbon option available to meet the Project Brief has not been selected and be approved by the Chief Executive
- Within 5 business days of the Chief Executive's decision the agency must inform the relevant portfolio Minister as well as the Minister for Economic and Regional Development¹.

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.

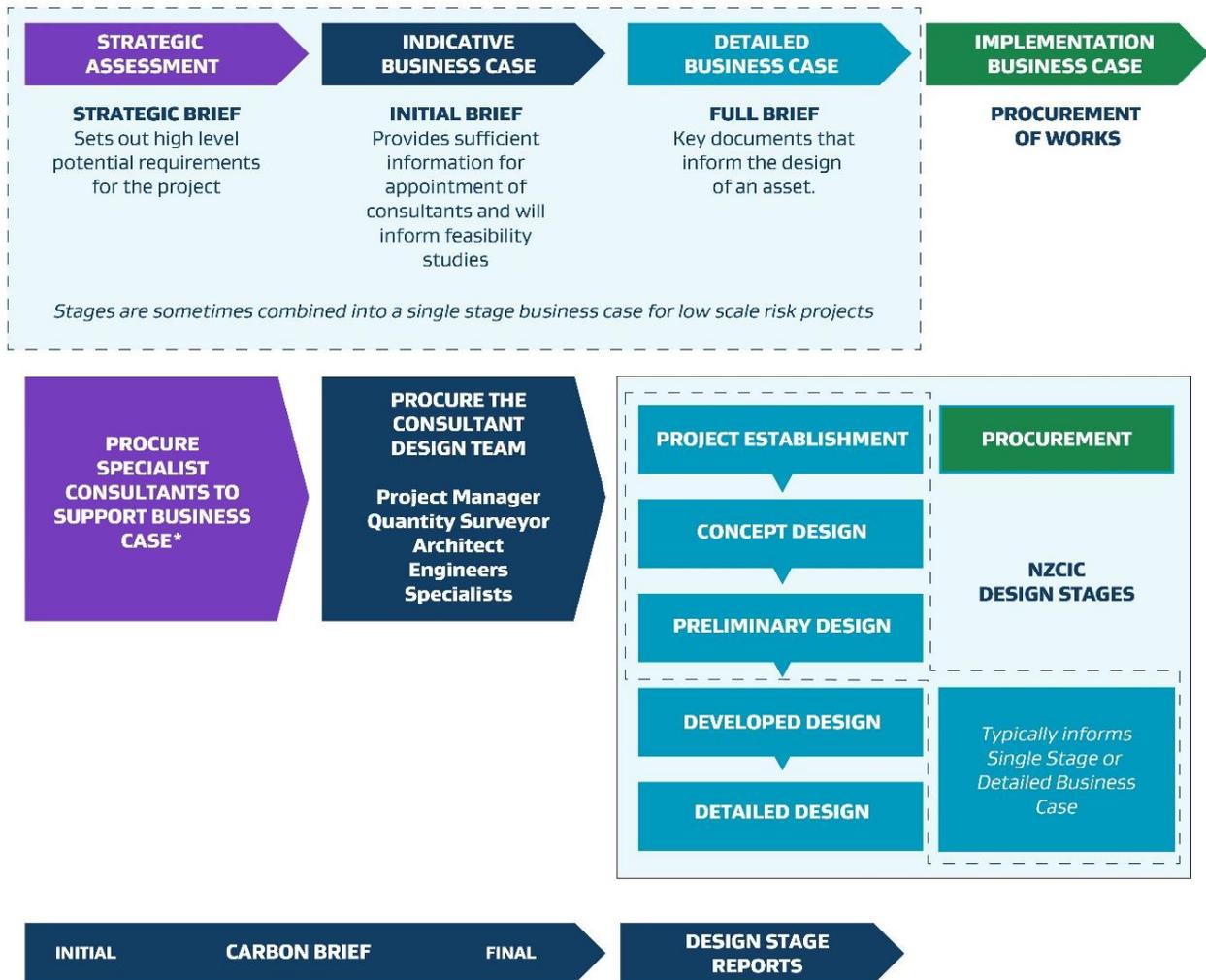
You can finalise the Carbon Brief to reflect accepted proposals and on-board the team with a focus on reducing carbon emissions during the design process.

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: 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), or
 - the implementation of an approved sustainable building rating system.
- 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).
- to provide specialist sustainability services such as energy, daylight and thermal comfort modelling, waste management planning, climate adaptation planning, or other specialist services.
- 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.

Requirement to use an approved sustainable building rating system for new non-residential buildings

As part of the Carbon Neutral Government Programme, agencies that are required to apply the Government Procurement Rules must use an approved sustainable building rating system (rating system) when building a new non-residential government owned building with an estimated capital value of:

- \$25 million and over from 1 April 2022
- \$9 million and over from 1 April 2023.

You can find out more about the requirement to use an approved rating system on the New Zealand Government Procurement website.

[Building rating systems | New Zealand Government Procurement and Property](#)

If the requirement to use an approved rating system does not apply – the requirements of this Guide continue to apply for all projects over \$9 million.

Approved rating tools

New Zealand Government Procurement will maintain a list of approved rating tools.

You can find the list of approved rating systems, as well as the rating standard and any other minimum requirements for an approved rating system, on the New Zealand Government Procurement website.

[List of approved rating systems](#)

Framework to enable rating tools to be assessed and approved

The Procurement Functional Leader (PFL) has been authorised to assess and approve new rating tools. New Zealand Government Procurement will support the PFL to undertake this responsibility.

Once a rating tool is approved it will be added to the list of approved rating tools.

Additional considerations for procuring the consultant team when using an approved rating system

- Select design consultants who have experience of applying rating systems for the type and nature of the project being procured.
- Identify who will act as the rating system manager for the project.
- Require proposals to separately identify costs associated with:
 - rating tool compliance management during the design phases
 - rating tool compliance management during the construction phase, including assumptions about contractor requirements and involvement
 - design development analysis and advice
 - compliance documentation
 - compliance analysis and reporting
 - compilation of compliance information and management of the certification application
- Define the interface between the design consultants and the rating system manager roles, with respect to compliance documentation and analysis.
- Require that all design consultants include provisions for the documentation and supporting evidence needed for rating system certification requirements.
- Ensure consultants have strong focus on risk management and an understanding of different procurement models and their potential to impact project outcomes with respect to carbon emissions.