Skills and competencies for sustainable construction: The role of construction trades

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1. Introduction

This guide, *Skills and competencies for sustainable construction: The role of construction trades*, is to assist you and those you work with to develop the technical skills and competencies to undertake climate action and implement sustainable construction. Climate action is about taking intentional steps to mitigate and address the impact of climate change. This can include increasing your knowledge about climate change to upskilling the technical skills you need for sustainability and climate action. This could also be taking more of a leadership role within your construction project or within your profession or company. We all can play a role in addressing climate change. The competencies we outline in this guide will not only help the environment, but also help you learn new skills that will be beneficial across your career. Everyone in the construction sector is known for being excellent problem solvers and innovators, who don't shy away from hard work. If we are to reduce our greenhouse gas emissions, we need your help, too! This guide is here to assist you with that journey.

This guide is split up into four key sections:

1. **Responsibility for climate action**
   outlines how the construction sector has a legal obligation to address climate change.

2. **Skills and competencies for zero carbon construction**
   outlines the technical skills required for sustainable construction.

3. **Putting the zero carbon competencies into practice**
   outlines seven actions that construction trades can do today to implement climate action into their work. We also outline a reflective exercise to assist with creating a pathway way for future climate action and to help create a plan to upskill and increase your practice and knowledge of sustainable construction.

4. **Further information**
   some links to key information sources to help you on your journey.

2. Responsibility for climate action

2.1. Legal obligations

Regulations within Aotearoa New Zealand are clear that those within the building and construction sector have an obligation to address sustainability to support the transition to sustainable construction.

2.1.1. *Climate Change Response (Zero Carbon) Amendment Act 2019*

The Climate Change Response (Zero Carbon) Amendment Act 2019 outlines how Aotearoa New Zealand will meet its legally binding commitment to the Paris Agreement, to limit the global average temperature increase to 1.5 °C above pre-industrial levels.

The Act set a domestic greenhouse gas (GHG) emissions reduction target for Aotearoa New Zealand to:

- reduce net emissions of all GHG gases (except biogenic methane) to zero by 2050, and
- reduce emissions of biogenic methane to 24–47 per cent below 2017 levels by 2050, including to 10 per cent below 2017 levels by 2030.[1]

The Act also:

- establishes a system of emissions budgets to act as stepping stones towards the long term target, and
- requires the Government to develop and implement policies for climate change adaptation and mitigation.

2.1.2. *Building Act 2004*

Section 3 of the Building Act 2004 outlines a commitment to ensure that the buildings we create allow:

i. people who use buildings can do so safely and without endangering their health; and

ii. buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them; and

iii. people who use a building can escape from the building if it is on fire; and

iv. buildings are designed, constructed, and able to be used in ways that promote sustainable development.[2]

2.1.3. *Licensed Building Practitioners*

The Licensed Building Practitioner (LBP) scheme outlines a number of behavioural expectations in its Code of Ethics, which are enforceable by the Building Practitioners Board.

The key aspects in the Code that relate to climate change include:

1.3 Avoid harming the environment

When carrying out or supervising building work, you must take all reasonable steps to avoid harming the environment.

3.3 Duty to inform and educate your client

You must provide your client with sufficient information and advice to enable them to make an informed decision to enable you to continue with your building work.[3]

The LBP scheme also has a set of competencies with associated performance indicators. Within these, understanding and managing environmental issues are a common feature for required skills and knowledge.[4]

These obligations make it clear that there is an expectation that construction trades should incorporate climate action into their practice.

[1] www.legislation.govt.nz/act/public/2019/0061/latest/LMS183736.html

[2] www.legislation.govt.nz/act/public/2004/0072/latest/dlm306036.html

[3] www.lbp.govt.nz/assets/lbp/documents/guidelines/code-of-ethics-guidelines-for-lbps.pdf

[4] See, for example, performance indicators for carpentry and roofing: www.lbp.govt.nz/assets/lbp/documents/factsheets/carpentry-factsheet.pdf www.lbp.govt.nz/assets/lbp/documents/factsheets/roofing-factsheet.pdf

2.2. Te ao Māori

Within Aotearoa New Zealand, te ao Māori has a lot to offer when thinking about sustainability and climate action. Te ao Māori (the Māori worldview) is a holistic worldview that emphasises the importance of relationships between nature and people. Te ao Māori is grounded in tikanga (culturally proscribed rules) and mātauranga (knowledge).

Integrating te ao Māori into your climate action includes considering Māori concepts in your thinking. For example, the concept of *Te Oranga o te Taiao* can help you think about sustainability and climate action in a way that illustrates how the environment is tied to all aspects of society. *Te Oranga o te Taiao* means all of the following:

a. the health of the natural environment; and
b. the relationship between the health of the natural environment and its capacity to sustain life; and
c. the relationship between the health of the natural environment and the health and well-being of people and communities; and
d. the interconnectedness of all parts of the environment; and
e. the relationship between iwi and hapū and te Taiao that is based on whakapapa.[5]

It is also important to acknowledge the important role that te Tiriti o Waitangi / the Treaty of Waitangi has in underpinning the relationship between the Crown and Māori. In order to bridge the gap between the literal differences between the Māori and English texts and to account for how our cultures have changed over time, the principles of *partnership*, *participation* and *protection* are used to apply te Tiriti / the Treaty in our current times.

Creating partnership and participation with Māori, iwi and Māori organisations and institutions is important to help protect the environment. Using mātauranga Māori can also be beneficial and provide ways for you to use local knowledge that can assist you with your climate action. Mātauranga Māori can provide valuable insights into the environment to assist your work. A good example that demonstrates the value of mātauranga Māori is the Te Reo o Te Repo – the Voice of the Wetland project undertaken by Landcare Research.

[5] Section 3 of the Natural and Built Environment Act 2023, www.legislation.govt.nz/act/public/2023/0046/latest/LMS846031.html?search=sw_096be8ed81e33392_Te+Oranga+o+te+Taiao_25_se&p=1&sr=2

3. Skills and competencies for sustainable construction

There are five skills and competencies that are the cornerstones of sustainable construction.

1. **Zero Carbon Balance:** The carbon balance is the net emissions that result from sources and sinks of carbon emissions. A building's carbon balance is calculated based on the embodied (i.e., the emissions from the manufacturing, transport, installation, use and end of life of building materials) and operational carbon (i.e., the emissions associated with energy use and the release of refrigerants during regular building operations) as well as avoided emissions. A zero carbon building achieves a balance of zero or less emissions, measured annually in terms of embodied and operational emissions. To achieve that balance, GHG emissions associated with building operations must be reduced through building design or offset emissions.
2. **Energy Efficiency:** Reducing energy demand and associated energy costs cuts emissions, improves the operating performance of a building, and reduces the environmental impacts of energy production. Energy efficiency is usually associated with heating, cooling, hot water and lighting. It focuses on meeting energy needs with the least amount of energy use and carbon emissions while also reducing the peak demand on the electricity grid.
3. **Low Carbon Materials:** Low-carbon materials refers to the reduced carbon emissions associated with manufacturing, transportation, construction and end-of-life phases of all built assets. This is accomplished by tracking the embodied carbon (emissions) associated with materials throughout the whole life cycle of a building.
4. **Adapting to Climate Change:** More than 80% of today's current buildings will still be in operation by 2050, and most of these will not have been designed to adapt to changing climates and the impacts of extreme weather events, including wildfires, heavy flooding, damaging winds, extreme heat and prolonged power outages. Building professionals will need to be well equipped with the skills required to design, construct and operate adaptable and resilient buildings that are also sustainable.
5. **Zero Carbon Practice:** Putting zero-carbon knowledge into practice will be critical for the transition to zero carbon by 2050. Enabling building professionals' confidence is essential. While formal continuing education and training is useful, one of the best ways to enable the building of confidence is peer-to-peer support – there is a need for construction professionals to support each other and share their knowledge and guidance with others. There is a need for construction professionals to support each other and share their knowledge and guidance with others. There is also a need for construction professionals to advocate climate change and zero-carbon design and construction across a construction project, from concept through to operation and end of life.

3.1. Skills and competencies for sustainable construction for construction trades

Purpose of the profile: to identify the core competencies and related performance indicators needed for the design and construction of sustainable buildings

Core skills and competencies and related performance indicators for sustainable design and construction

Core competency	Performance indicators
Zero Carbon Knowledge	• Awareness of environmental impact of buildings, especially climate change. • Awareness of how your trade contributes to greenhouse gas emissions. • Awareness of whole building, whole of life emissions and their calculation. • Learning from case studies of sustainable construction. • Understanding of how your trade relates to the wider company operational strategy on climate change. • Understanding of principles of sustainable building in general. • Understanding of transition plans, especially how the trades interrelate with the wider company operations and strategy in relation to climate change.
Zero Carbon Practice	• Actively engaging in continuous learning, and training about zero carbon and core building science. • Advocating for sustainable construction to colleagues, clients and others. • Caring for the environment. • Demonstrating and sharing sustainability and zero carbon knowledge and experience with others.
Zero Carbon Building	• Awareness of passive solar design. • Understanding of the role of your trade in achieving required energy and carbon performance to minimise energy demand and associated costs over the life of the building. • Understanding of principles of airtightness and requirements for effectively installing the air barrier (Sealing at junctions and penetrations). » Understanding of different insulation types and how it works. » Understanding of effective insulation installation including: Insulation fitting and placement for different insulation types (including consequences of poor installation) » Thermal bridging and condensation risks » Thermal bypassing. • Understanding impacts of trade on the design and installation of efficient energy and ventilation services. • Understanding of basic principles of building science: » Building envelope. » Heat retention and loss (season, heat exchange, properties of materials), » Main causes of overheating and how to reduce it. » Window quality and positioning. • Refurbishment - understanding effect upon building fabric of remedial or new installation work.
Sustainable Products	• Identify and use of sustainable, non-toxic and responsibly sourced products that are low in embodied carbon. • Keeping labels and marking of materials used (eg for any certification requirements if required).

Core competency	Learning outcomes
Waste minimisation, reuse and recycling	• Understanding of materials storage, recycling and reuse opportunities in order to minimise waste. • Distinguishing dangerous and non-dangerous materials, triage categories, recyclables and disposable materials. • Understanding of the categories of disposables and/or disposal procedures. • Understanding of handling risks and rules for removal of environmental hazardous materials and other dangerous materials. • Protecting environment and oneself and colleagues from harmful materials and substances. • Understanding how to sort construction waste on-site. • Awareness of sorting methods and how to organise them. • Identifying and separating waste into different categories. Including sorting disposables. • Understanding waste material pathways for recycling, refuse and re-use etc. • Identify opportunities for reuse of construction materials. • Awareness of where to take construction waste, such as product stewardship schemes. In case of doubt – determine destination of disposables. • Having ecological awareness and awareness of final consequences of poor management of disposables • Being systematic in gathering disposables • Acting when waste container is full. • Advocate for less construction waste, such as asking suppliers to not wrap materials in plastic etc.
Water	• Awareness of storm water processes. • Having working knowledge of water efficiency on a construction site. • Understanding and awareness of different water heating systems.
Legal requirements	• Understanding of responsibilities under Licensed Building Practitioners (LBPs) programme, such as 'You must avoid harming the environment'. • Knowledge of regulations, rules and standards in relation to zero carbon building eg. Including recent updates to the Building Act. • Knowledge of key policies: such as the Whole of Life Embodied Carbon Framework, Transforming Operational Efficiency Framework etc
Whole build process	• Awareness of how to communicate with different trades throughout whole build process. • Understand role of dependant trades in whole build process. • Understanding requirements and objectives of construction project and process.
Personal capability	• Duty of care necessary for apprentices and teaching/providing opportunities for sustainable practice. • Analysing state of site, diagnosing problems and solutions. • Assisting colleagues so that the construction team can work ergonomically. • Being open to questions and learning. • Bringing a positive attitude- wanting to give things a go, being courageous. • Co-operation, ability to see different points of view, for example, exchanging information with colleagues and clients in a friendly constructive manner. Having courage to accept colleagues' remarks relating to work, security and taking responsibility for pointing out dangerous situations. • Co-ordination, communication, evaluation and negotiation, such as reacting to diverse situations. • Curiosity, independence, self-evaluation for example posing a sense of initiative, tackling problems arising by oneself. • Display conduct, way of thinking and behaviour necessary to practice occupation. • Helping to develop a supportive environment onsite. • Possessing a critical and analytical mindset. • Taking care to do jobs well.

3.2. How to develop these skills and competencies

Formal training and education programmes

Many polytechs offer part-time certificate programmes, and diploma and degree programmes can be studied at both polytechs and universities.

Professional development workshops, seminars and trade talks

In a recent research study,[6] those in the construction trades reported they liked learning through online courses, in-person courses especially those that provide practical, hands-on information.

On-the-job collaboration and mentoring

In the same study, those in the construction trades also emphasised the importance of 'education on the job', learning through practice and real-world application, saying they find it helpful to work on projects to solidify their understanding.

Having a support person or mentor to help you develop your skills can also be very helpful. (For a deeper discussion of the role of mentors, see Section 4.2 Taking your climate action to the next level.)

[6] Knight, A. MacGregor, C., & Lockyer, O. (2025) *Skills and competencies for zero-carbon construction: Perspectives of architects and designers.* BRANZ Study Report. BRANZ Ltd.

4. Putting the sustainable construction competencies into practice

Putting into practice the skills and competencies for sustainable construction is a key element of climate action. We acknowledge a number of challenges the sector has in meeting competing demands. However, implementing climate action into your practice doesn't need to be difficult. In this section we outline seven simple actions you could implement now to incorporate sustainability especially zero-carbon practices into your work. We also present a more detailed reflective template to help you develop a more comprehensive plan to put these competencies into practice.

4.1. Seven actions construction trades can take now to address climate change

In recent years, there has been a growing emphasis on sustainability, particularly in sustainable construction practices. This is evident with the introduction of initiatives like the MBIE embodied carbon and transforming operational efficiency frameworks. Although discussions about emissions and sustainability are important, they can sometimes be overwhelming. You may be left wondering where to start on your zero-carbon journey. What can you do right now? Below we outline seven practical actions that construction trades can take to help begin your zero-carbon journey.

4.1.1. Action 1: Learn about what zero carbon means and why it is important

It can sometimes be challenging for tradespeople to know the actions they can take to address climate change or the transition to zero carbon. A helpful first step can just be familiarising yourself with common terms and concepts that are often used when talking about climate change in the construction sector.

Resources such as Engineering New Zealand's Climate Change 101 – An introductory guide provide explanations about climate change is, and provides definitions for key concepts. Additionally, you may find the glossary of terms by MBIE Building for Climate Change programme to be useful. BRANZ's own Reducing carbon video series offers short videos that provide guidance on the environmental impact of buildings over their lifetime.

4.1.2. Action 2: Keeping building knowledge up to date

Building regulation recently has undergone a number of changes. The biggest recent change relates to the update to H1- energy efficiency requirements in the Building Code. It is crucial to have a strong understanding of the building envelope, especially with regards to principles of airtightness and proper installation of the air barrier (such as sealing junctions and penetrations). BRANZ research found that over 60% of wall insulation was incorrectly installed. Understanding effective insulation installation includes:

- Understanding the fitting and placement for different insulation types (including consequences of poor installation)
- Understanding and applying concepts like thermal bridging, condensation risks and thermal bypassing.

To assist you with upskilling around the recent changes to H1- energy efficiency visit the H1 Hub. To learn more about thermal bridging check out: BRANZ Bulletin BU690 Thermal bridges in external wall framing.

4.1.3. Action 3: Take action on waste

Separating and sorting your waste into different types and recycling or reusing unwanted materials is perhaps the best and most simple way to address climate change. This is important as construction and demolition produces around 30–50% of total waste sent to landfill (for more see Bulletin 671), it may also lead to cost savings in the long run.

There are number of things you can do to support waste minimisation at the start of projects to plan for success:

- Talk with clients or construction project owners about designing out waste.
- Set waste reduction goals and assign responsibilities within the contractual agreements set up between the client, designer, main contractor, and sub-contractors working on the project.

- Ensure that a REBRI Waste Minimisation Plan is required in the contract and is a part of contract documentation.
- Encourage a culture of waste minimisation on the construction site with an onsite champion to provide guidance, encouragement and accountable.
- Regularly communicate waste minimisation expectations and processes to all team members involves in the project, including subcontractors.
- Set targets for reducing the amount of each waste type generated.
- Ask for advice from others if you are unsure of how to handle certain materials.
- Work with materials suppliers to ensure they do not over-supply and organise the return of unused materials.
- Work with others who can support you and your waste reduction goals.

REBRI reducing building material waste is a tool kit that offers guidance on tackling waste. A key tool in REBRI is the BRANZ Resource Recovery Map - which is a searchable map that will help you figure out where you can take your waste.

4.1.4. *Action 4: Be sustainable*

In order to promote sustainability, we recommend identifying and using products that are sustainably and responsibly sourced whenever possible. Sustainable products are more likely to have low embodied carbon, which refers to the emissions generated throughout the product's lifecycle, including extraction, production, manufacturing, and transportation. As we strive to achieve our goal of zero carbon by 2050, prioritising materials with low embodied carbon becomes increasingly important, as they have the ability to store greenhouse gases (See Build 177).

It is also important to keep a record of materials use and keep any labels, especially if the build project is part of a certification scheme, such as Homestar or Living Building Challenge. Managing resources onsite is also important, such as conserving water by using aerated or sensor-controlled taps, low flush toilets, or trigger-operated hoses.

4.1.5. *Action 5: Understand your role*

The construction process consists of many parts completed at different times and stages. It is important that everyone has a good understanding of the entire build process. This includes being aware of the roles that all trades play in the construction process. If everyone involved on the construction process has a shared understanding of their roles and the process, it can help minimise errors and reduce waste. All workers on a building project should be aware of the way in which their work can impact air permeability of buildings and the adverse consequences of not sealing the fabric properly. The building's thermal envelope is the cornerstone of sustainable construction.

4.1.6. *Action 6: Enhance personal skills*

While sustainable construction focuses on the environmental impact of the process, it is important to remember that sustainability also requires the right mindset and abilities. A positive growth mindset is a key foundation for any job. Being involved in construction is about lifelong learning. It is imperative that we continue learning and growing whatever stage you are in your career.

It is beneficial to focus on developing and enhancing personal skills, and it may be helpful to chat with your boss or company about how they can support your professional development. Some personal skills to continue developing include:

- Curiosity, independence, and self-evaluation, such as taking initiative and solving problems independently.
- Possessing a critical and analytical mindset.
- Cooperating with others and considering different perspectives, such as exchanging information with clients and colleagues in a constructive and friendly manner.
- Having the courage to accept colleagues' remarks relating to work, security and taking responsibility for pointing out dangerous situations.
- Assisting colleagues so that the construction team can work safely and efficiently.
- Co-ordination, communication, evaluation and negotiation, such as reacting to diverse situations.
- Analysing site conditions, diagnosing problems, and finding solutions.
- Display conduct, way of thinking and behaviour necessary to do your job to a level of satisfaction of yourself and those around you.

4.1.7. Action 7: Advocate for zero carbon

Investing time into upskilling your knowledge and competencies around zero carbon construction will take effort, but it means you will be prepared for upcoming changes to the industry. You shouldn't be quiet about this mahi – share your knowledge with your colleagues! You should take an active role in advocating sustainability to your colleagues, from the experienced through to the apprentices, clients, and anyone else you think should be aware.

4.2. Taking your climate action to the next level

There are many ways you can upskill yourself on sustainable construction. You could implement some of the ideas in the previous section, undertake a formal qualification or you could start making yourself a plan for your zero-carbon learning journey.

Putting sustainable construction into practice

We have developed a checklist to assist your zero-carbon learning journey. The checklist is there to help you think through your learning journey. You can complete it by yourself or with others or as part of a team.

Not all learning requires abstract conceptualisation. Mastering skills may require incremental practice to improve proficiency. In addition to incremental practice (that is, doing it), it is critical that this practice also includes feedback and reflection to help you understand gaps in your practice and to rectify any issues.

Learning is a continuous process that starts with you, the learner, analysing and understanding your learning needs. However, it is critically to have others to support you through this process. This support person could be a work colleague, a person at your company who is a champion of sustainability or an organisation like BRANZ, Registered Master Builders Association, New Zealand Certified Builders or more specialist organisations, such as the New Zealand Green Building Council, the Superhome Movement or Passive House Institute of New Zealand (PHINZ) and many others who can help you through your journey.

It is important in your learning journey to:

- Understand what skills or capabilities you need to be develop.
- Plan, with the help of a mentor, how to build upon your identified areas for development and agree on your learning goals.
- Put things into practice (with the guidance of a mentor).
- Undertake agreed learning strategies and applying and practising the learning in context.
- Keep in mind that learning is a continuous process for the learner, the mentor and all involved; reflecting upon your learning and practice, as well as seeking and receiving feedback is an important part of the process.
- Always reflect on your learning goals and their progress as this reflection will help you to identify what is working – and what is not. If things are not working as you hoped, reflect and seek feedback. But whatever you do, don't continue doing it if its not working for you.
- Be open and share what you have learnt with others throughout your learning journey. The change from learner to mentor is an important part of the journey.
- Mentoring and showing others how to do sustainable construction will benefit you just as much as it will help them.

While it can seem intimidating at the start, all the people you see as 'experts' once started in your position. Taking that first step in your journey is the hardest, but also the most fulfilling – just do it!

4.3. Climate action checklist for construction trades

	Assessing needs
1	What is your role?
2	What are your sustainability goals?
3	What are the main skills you wish to focus on?
4	What stage is the project in? For example, planning, design, construction, etc.?
5	How are you and your project supporting climate action currently?
6	What are the challenges and/or barriers holding you back?
	Planning
7	Who have you consulted about your sustainability goals?
8	How does your role relate to others on the build? For example, do you need to include others in this learning journey?
9	Who can assist you in implementing your sustainability goals?
10	What skills/information/support do you need to implement your sustainability goals?
11	What are the potential impacts of your chosen sustainability strategies?
12	What support do you need from your company, client, colleagues to implement these sustainability goals?

	Learning
13	How do you learn best?
14	What are your motivations to implementing sustainable construction?
15	Who can assist you on your learning journey?
16	What advice or support do you need for your learning journey?
	Reflecting and applying
17	Is the project and/or company open to implementing sustainability actions? Yes No
18	How could you take the project/company on that sustainability or zero-carbon journey with you?
19	Who will help you drive sustainability within your practice/ project?
20	What are the sustainability strategies you will implement?
	Evaluation
21	What has been positive/negative about implementing sustainability practices into the project?
22	Did you achieve the sustainability goals you set? Yes No
23	What would you do differently next time?

24	What were the main challenges at the onsite/project/company levels to implementing your sustainability goals?
	Facilitation process
25	Who are the project/company champions who could assist you in implementing your sustainability goals?
26	Who can offer you assistance and support for your sustainability/zero-carbon actions?
27	What feedback do you have?
28	What lessons have you learnt that you can share with others?

5. Further information

BRANZ sustainable building resources
www.branz.co.nz/sustainable-building/

The following organisations also have resources to assist you:

Engineering New Zealand
www.engineeringnz.org/programmes/engineering-climate-action

New Zealand Green Building Council
nzgbc.org.nz

New Zealand Certifed Builders Association
www.nzcb.nz

Passive House Institute of New Zealand
passivehouse.nz

Registered Master Builder Association
www.masterbuilder.org.nz

Superhome Movement
www.superhome.co.nz

Conclusion

The construction trades have a key role to play in addressing sustainability, in terms of constructing buildings that are both more resilient to the extreme weather events brought about by climate change and that have the lowest possible impact on the climate during their construction and lifetime operation. The skills and competencies for sustainable construction for construction trades as outlined in this document are there to assist you in your learning journey. All people working in construction should be aware of and familiar with how their work and construction activities impact the environment and contribute to greenhouse gas emissions. It is hoped these competencies will help guide you to create some actions to include climate action in your work.