Need to know:

Carbon in the built environment

The building and construction industry is a major source of global greenhouse gas emissions (carbon emissions). A building or infrastructure project generates carbon emissions throughout its life cycle, from producing materials and constructing the asset to operating and maintaining it, as well as what happens to the asset at the end of its life. The total amount of carbon emitted by an asset throughout its life is often called whole-of-life carbon.

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Sustainability tools and concepts can seem daunting, we know.

We're here to help with our suite of thinkstep-anz Need to Know (NTK) guides. They're short, they sum up what you need to know (and leave out what you don't) and we've written them in plain English. <u>Check out all our NTKs on</u> <u>our website.</u>

Why does it matter?

A <u>2024 study by Infrastructure Australia</u> found that buildings and infrastructure are directly responsible for about 30% of Australia's total carbon emissions, while <u>thinkstep-anz's 2019 study</u> suggests that New Zealand's built environment contributes about 20% of the country's carbon footprint. The difference comes mainly from Australia's higher reliance on fossil fuels for electricity, a larger and more carbonintensive construction sector and more extensive infrastructure.

Carbon emissions from buildings and infrastructure come from two main sources:

- Embodied emissions are associated with constructing and maintaining an asset, as well as treating waste at the end of the asset's life.
- Upfront emissions are those embodied emissions that happen before the asset is in use.
- Operational emissions are associated with using an asset. They come mainly from using electricity and fossil fuels such as natural gas and diesel.



Carbon in the building life cycle







Measuring carbon in the built environment

Predicting the carbon emissions of an asset's entire life cycle can be challenging, as they depend on how it is used, maintained and potentially changed over time. For example, estimating the total carbon footprint of a building includes guessing how much energy it will use over its lifetime, how often materials will need replacing, and how it will eventually be demolished and the materials disposed or reused.

This uncertainty doesn't apply to upfront carbon as these emissions are released before the asset is used and can be measured using actual data.

Environmental Product Declarations (EPDs) play an important role

EPDs play a crucial role in reducing emissions in the construction industry by:



Supporting more sustainable decision-making

EPDs provide reliable data that helps building professionals select the most sustainable options for their projects.



Scoring points under green building rating tools

EPDs can help buildings earn points under green building rating tools like <u>Green Star</u>, <u>NABERS Embodied Carbon</u> and the <u>ISC IS</u> <u>Rating Scheme</u>. EPDs for building products must comply with EN 15804 or ISO 21930 to provide comparable data.



Transparent communication

EPDs help manufacturers present verified, science-based data about the environmental impact of their products in a clear, structured way that follows international standards.



EPDs are:

- Based on Life Cycle Assessment (LCA)
- ⊘ Science-based
- Follow international standards
- Independently verified
- Publicly available



Examples of EPDs produced by thinkstep-anz. EPDs published through EPD Australasia can be found <u>online here.</u>





Building a low-carbon future

Embodied carbon from materials and construction isn't just about the emissions released before a building is finished – it also includes emissions throughout its entire life cycle, which can add up significantly.

For example, replacing flooring, repairing concrete or demolishing a building at the end of its life all generate carbon emissions. To minimise a building's total carbon footprint, every stage – from design and construction to maintenance and demolition – needs to be planned with carbon reduction in mind.

Beware of trade-offs

When choosing materials to minimise upfront carbon, it's important to be aware of potential trade-offs.

\rightarrow Durability and lifespan:

- Materials with short lifespans or low durability may need replacing sooner.
- → Functionality and compliance:

Materials must meet required standards and provide the necessary functionality.

Choosing the lowest carbon materials upfront might lead to higher emissions over time if they need to be replaced sooner. This means that these impacts need to be carefully considered from the start to avoid unintended consequences.



Circular economy

The future of construction must embrace the principles of the circular economy, where materials are reused and recycled rather than discarded. By designing assets that are adaptable, durable and easy to dismantle, industry can significantly reduce waste and minimise environmental impacts.

→ Find out more in our <u>circular</u> <u>economy Need to Know guide</u>.







Boost carbon reductions from the beginning

While opportunities to cut embodied carbon vary by project and location, the biggest reductions are typically achieved in the early planning and design stages.

Opportunities to reduce embodied carbon from design stage of process



Asset development stages

Source: Adapted from HM Treasury Infrastructure Carbon Review, 2013



To decarbonise the built environment, we need to minimise all emissions.

This means:

- rew assets must be highly energy efficient and operate without fossil fuels
- building products and (de)construction practices must rapidly decarbonise
- existing assets must transition towards operating on 100% renewable energy.



We also need to look at how assets perform over time.

We need to ask:

- → Are they energy efficient?
- Are their materials durable?
- Can they be **repurposed** rather than demolished?
- Can their materials be reused or recycled at the end of their life?

These questions are essential to make sure that assets not only reduce their initial emissions but also stay more sustainable over time.







Keen to

Please contact us. Our

specialists would love

Check out the other guides in our growing

Need to Know series:

 \rightarrow Product carbon

footprint

→ Life Cycle Assessment

→ Environmental Product

Declarations (EPDs)

meet@thinkstep-anz.com

to talk with you.

learn more?

About thinkstep-anz

We're an independent sustainability firm with offices in Australia and Aotearoa New Zealand.

We focus on what matters and use data to understand organisations and their impact. We provide practical resources and ideas that move you ahead.

It's what we've been doing since 2006 - bringing our technical expertise and business know-how to create value for organisations like yours and help you tell your story.

Succeed sustainably

Let's work together to put sustainability at the heart of your business: your strategy, products and services, your processes, technology and relationships. We'll set you up to succeed and inspire you to keep achieving more.

Then let's share your success with those who need to hear it, in a way they'll understand and want to read.

Let's succeed sustainably together.



Product









Reporting Communication



Found this useful? Please pass it on!

We don't just talk about sustainability we practise it too:









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