

PROJECT #11: THE ENVIRONMENTAL CREDENTIALS FOR BUILDING TECHNOLOGY PLATFORMS

Date commenced: March 2021

Date completed: Ongoing

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PROJECT DESCRIPTION

Digital product platforms are a key enabler of Building 4.0 CRC's vision of an efficient, connected and customer-centric construction industry. They give businesses visibility, certainty and control over the whole supply chain, while customers can participate in the project design. They can also help users identify inefficiencies in the supply chain, reducing financial costs and enabling environmental savings. The outcome is a building that is more efficient, cost effective and environmentally sustainable.

However, ways to systematically assess the environmental impact of building platforms are not readily available.

Monash University researchers are collaborating with industry partners utecture and the Donovan Group to address this knowledge gap. In simple terms, Project #11 explores how platforms can provide key decision makers with environmental support or insights during the development phases of a construction project.

PROJECT OBJECTIVES

Project #11 started with 3 main objectives:

- Define and test an assessment framework for building technology platforms, to evaluate and communicate their environmental performance. Researchers are working with utecture to develop and apply the framework to 2 digital products: utecture[™] and Airbuildr[™].
- Deliver a software implementation brief so research outcomes can be incorporated on the utecture[™] and Airbuildr[™] product ecosystem.
- Uncover new commercialisation and development pathways, so the Donovan Group can leverage the environmental performance assessment framework beyond internal operations.

Using platforms can enable a reduction in CO₂ emissions in excess of 10%. These savings are associated with design and sales efficiencies and material optimisation.



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Project #11 was expanded to explore 2 practical applications.

PRACTICAL APPLICATION 1 - Life Cycle Assessment of DonoBeam Tapered Box Beam (TBB)

Researchers used material quantities from the Airbuildr[™]/Constructor platform to compare 3 structural design alternatives in various geographic locations:

- TBB using 350 Grade steel
- TBB using 450 Grade steel .
- a traditional Universal Beam/Welded Beam (UB/WB system).

The study found using TBB products can enable significant environmental savings – around 41% on average for the case studies evaluated in Australia. These savings are mainly associated with material savings (~90%), but also with transporting material and manufactured components.

4 areas for future research:

- Incorporate components such as foundations, paint or steel surface treatment, secondary structures and facade systems.
- Analyse relationships between design factors • (e.g. layout geometry and span clearance) and other building typologies.
- Cover the complete life cycle of buildings, including use, end-of-life, and benefits and loads beyond the system boundary stages.
- Focus on embedding embodied carbon assessment capabilities within the Airbuildr[™]/Constructor design platform.

PRACTICAL APPLICATION 2 – Pathways to net-zero

Researchers are working with utecture and the Donovan Group to identify pathways for both companies to become net-zero greenhouse gas (GHG) emissions companies. This work involves analysing the current environmental impacts of both companies' operational requirements using primary data, and then reviewing national and international certification schemes to identify the most appropriate support to business-tobusiness (B2B) and business-to-consumer (B2C) communication needs.

5 areas for future research:

- Net-zero certification •
- Cost-effective mitigation initiatives
- Third-party verification of GHG reporting
- KPIs for ongoing emissions monitoring
- Introduction of circularity principles to business models.

The Project #11 outcomes demonstrate leadership in equipping the Australian construction sector with tools to positively contribute to sustainability and climate action. The folded box beam is an exemplar of innovating with building materials to find efficiencies. But it also underscores the importance of bringing industry players on to digital platforms that enable evidence-based decision making to achieve best practice.

PROFESSOR CHRIS KNAPP, RESEARCH DIRECTOR, BUILDING 4.0 CRC









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