Decarbonising Infrastructure Delivery

Using structural timber to reduce carbon – New Sydney Fish Market

Summary

The NSW Government is delivering a new Sydney Fish Market. The $750 million project will create 6,000m² of new public space and will be the largest fish market in the Southern Hemisphere. Architects 3XN have worked with Sydney firms BVN and ASPECT Studios to design the new facility. The project team has reduced the emissions associated with the facility's construction by selecting low-carbon materials, optimising transport to the site (including through local material sourcing), and using renewable diesel.

Through considering carbon in design and construction, the new Sydney Fish Market is reducing upfront carbon compared to more traditional methods. For example, by choosing to use glulam beams instead of traditional steel frames, using renewable fuel and transporting materials by barge to reduce the number of trucks on the road.

Photo credit – Multiplex, November 2024

- **Delivery agency:** Infrastructure NSW
- **Delivery partners:** Multiplex
- **Project stage:** Construction (estimated completion 2025)

Reducing upfront carbon during the design and construction of the new Sydney Fish Market

Raw material supply (A1 – A3) The new Sydney Fish Market is being built using low environmental impact materials. There was an early decision to specify timber in the concept design, and these timber beams have a lower carbon footprint than traditional steel frames using less water and energy consumption during production.

Cross-laminated timber is a homogenised wood-based plate-like material. The glulam beams used in the new Sydney Fish Market are manufactured from sustainable sawn timber sourced from sustainable forestry. Engineered timber is strong and light, resulting in 30% less dead load compared to comparable concrete structures, and provides the opportunity to retrofit existing structures.[1]

Additionally, concrete used for the new Sydney Fish Market has been designed to meet sustainability requirements by using high recycled content.[2]

Transport (A4) Materials have been delivered to site by barge from the Glebe Island staging area, reducing the number of trucks required. As of November 2024, there have been 995 barge deliveries, reducing truck trips by over 5,650. Further, concrete is sourced from local suppliers to reduce the carbon footprint of deliveries to the site.

Construction and installation process (A5) Tower cranes on site are powered by renewable diesel, reducing greenhouse emissions from crane operations by up to 90% compared to fossil fuel diesel.

Circular Economy / Recycling (D) The marine pile offcuts have been recycled via local steel mills into steel re-enforcement.

1 https://theca.com.au/sustainability

2 https://newsydneyfishmarket.insw.com/insw/new-sydney-fish-market/sustainability

Lessons learnt

The nature of the design, such as the geometry of the roof and limited access for installation was particularly challenging. Early planning of the design, fabrication, logistics and placement of the glulam beams through in-depth workshops to develop the install strategy was critical for the successful installation of the roof structure.

594
Glulam timber beams

5,654
Number of truck trips reduced so far

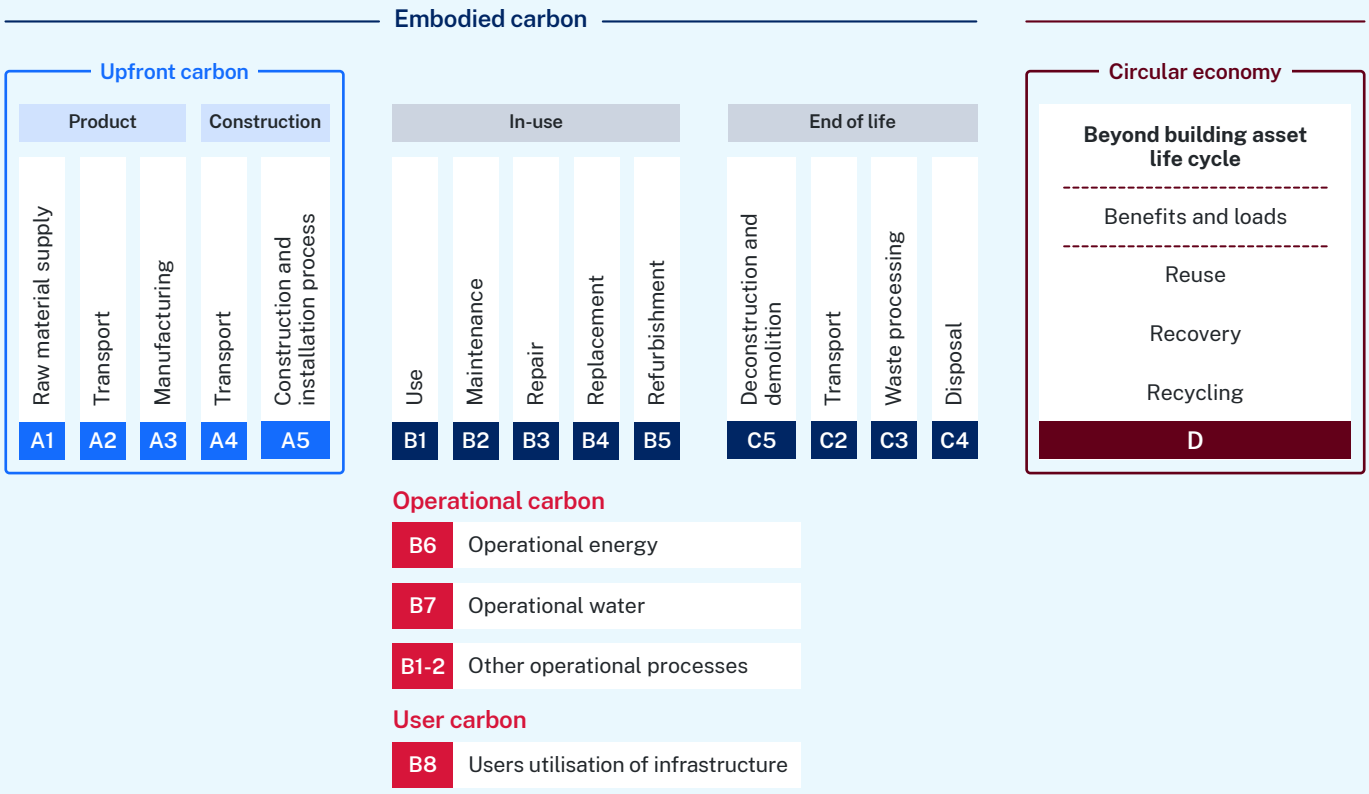
41,253
Litres of renewable diesel in the cranes

Additional initiatives reducing whole-of-life carbon

Operational energy and water (B6-7) There are over 400 roof cassettes that are multi-functional. They act as solar shading from direct rays while also providing reflective sunlight to naturally illuminate the upper levels. They also offer natural ventilation, water collection for irrigation and amenities, and the integration of solar panels, which are expected to generate up to 5% of the building's daily energy consumption.

Circular Economy / Reuse (D) The modular framework provides flexibility to enable spaces and places to overlap, change shape and form, to create new and diverse zones for different operations under one roof. This feature will allow the facility to adapt to future user needs without requiring extensive carbon-intensive works.

Whole-of-life carbon[3]



3 Adapted from PAS2080:2023 and modules in EN 17472:2022