

ENVIRONMENTAL PERFORMANCE OF STEEL IN THE BUILT ENVIRONMENT (SUSTAINABLE BUILDINGS)

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The built environment (buildings and infrastructure) drives around half of the material flows in the Australian economy. Compared to Australian totals, it is estimated that buildings use 30% of raw materials, 42% of energy and 25% fresh water and are responsible for 40% of atmospheric emissions, 20% of water effluents and 25% of solid waste. The built environment represents the most important value chains for many mineral and metal materials and therefore the most important stewardship challenges and opportunities. This is certainly the case for steel, where residential and commercial buildings alone account for an estimated 33% of steel consumption in Australia, before considering engineering, mining and civil infrastructure.

The industry has a proven track record of improving the life cycle environmental performance of steel materials and buildings through eco-efficient production, recycling and the smart design of building systems using steel.

Energy and Greenhouse Gas intensity of steel production have decreased by an estimated 40% over the past quarter century through persistent improvement and the introduction of continuous casting. Fresh water use has been roughly halved over the past decade. Currently around 70% of the main process residues (slags) are sold for use in cement blends and construction aggregates, the remainder stored on site and not sent to landfill. The average recovery rate for scrap steel building materials is around 85%. For structural steel the recovery rate is as high as 95%, which matches world's best practice. Recovered steel is recycled through the basic oxygen and electric arc steelmaking processes or in some cases re-used directly without remelting.

Innovation in the design of building systems that leverage the special qualities of steel is considered the most fertile area for future advance. Good functional, aesthetic and environmental design can leverage the intrinsic qualities of steel, such as strength to weight ratio, surface coatings, weldability and flexible fabrication/dismantling techniques, as shown in the attached case studies * Extending the useful life and value of materials and buildings greatly improves their life cycle environmental impacts.



In highlighting steel's potential to contribute to building designs with improved overall life cycle environmental performance, there is no intention to imply that steel is 'better' than other building materials, such as timber, concrete, aluminium and so forth. All materials have their distinctive properties and advantages in particular circumstances. Environmental impact comparisons between different materials need to consider the value that is being created, the function that is being fulfilled, the need that is being addressed and the aesthetics for particular applications.

Continuous improvement in eco-efficiency during production, world class recycling rates and product development combined with design flexibility and innovation ensure that steel will continue to make a positive contribution to the life cycle performance of the built environment in Australia.

* Provided by OneSteel

Lighter structures

The lighter steel frame for the Latitude @ World Square building in Sydney NSW allowed more floor area to be built for the same structural mass with significantly reduced strengthening costs and building foundation footprint.



Flexible Upgrading

Existing steelwork at Chifley Tower, Sydney was modified to accommodate a new and more energy efficient air conditioning system and the addition of internal stairs reduced the reliance on lifts.

Building on Material Value

Lighter steel frame at 347 Kent Street, Sydney, allowed 8 levels to be added to the existing 15 level building while still tenanted and functioning with around 1,000 people. Lighter steel frame reduced strengthening requirements by >50%. New floors attract higher rent income, since they have better views.



Design for Re-Use

Whole steel structures such as stadium seating may be used for another purpose at another location. A good example is part of the Sydney Aquatic Centre, which was dismantled after the Olympics and relocated to WIN Stadium in Wollongong.