Sustainability - Retrofit & Reuse

Reusing, renovating and retrofitting older assets plays a big part in reducing the carbon profile of the buildings sector. Particularly so given the vast number of existing assets (and embodied carbon) that are candidates for seismic upgrades – with the demolition of viable older buildings (often including heritage buildings) at odds with society's desire for a lower carbon economy.

With the world moving towards Zero Carbon targets, significant changes in the building sector are required. Emissions for buildings arise from both the operation and the embodied carbon. Based on the significant advancements in building energy technology, the focus is moving more toward embodied carbon, a large portion of which is associated with the structure.

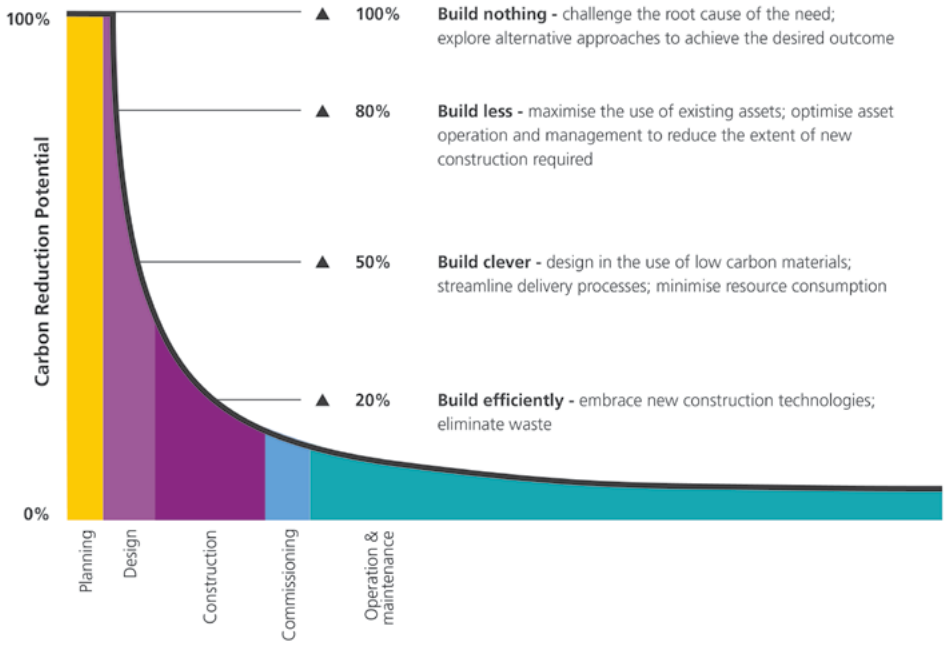
Since older buildings make up most of the real estate stock of our cities around the world, their reuse through renovations and retrofit plays an important part here. In seismic areas, retrofit work is really the catalyst for moving into the next phase of life.

Recent earthquakes in New Zealand have brought to light the necessity to move away from constructing code-minimum structures that are designed for life-safety but are frequently "disposable" after a moderate earthquake event, particularly in relation to a structure's ability to minimise damage. Building clever by resilient design and optimizing material usage and design using advanced dynamic methods.

Reuse and Seismic Retrofit

We offer different services for reuse and retrofit design:

- Seismic strengthening
- MOODD (multi-objective optimized dynamic design)
- Environmentally sustainable design (LEED, Zero Energy, Living Buildings, NABERS)
- Life cycle assessments (LCA) By leveraging Beca expertise across seismic design and Environmentally Sustainable Design, we can offer a more holistic and technically robust service



B201, Auckland University

Location Auckland, New Zealand

The University acknowledges that a healthy natural environment and well-constructed built environment results in a positive impact on overall community for students and staff alike.

The University is focused and committed to save energy as well as carbon emissions in their buildings and to minimise the materials, water and waste it uses or produces. As a result of these efforts among other initiatives, The University of Auckland has now been ranked No. 1 for two consecutive years in the University Impact Rankings by Times Higher Education.

The University's aspiration to achieve a 6 Star Green Star rating places B201 on the international stage among some of the world's most sustainable buildings. The project involves a 50-year life extension and complete refurbishment of the existing structural frame (often referred to as 'adaptive re-use'), including: a new facade, new building services and internal layouts, seismic retrofit to a target of 67% NBS (new building standard), expansion of the building site with a new covered plaza and feature roof, an extension to Level 7 of the north building and a new circulation node at the Wynyard Street entry.

Rankine Brown Library Building, Victoria University

Location Wellington, New Zealand

This 1960s built library underwent a major upgrade in 2002, including the base isolation of the primary building columns, but excluded the lift shafts. The 2016 earthquake (7.8 magnitude) caused significant cracking of the lift shaft. Temporary propping works commenced soon after to secure the lift shafts and minimise the risk of further damage from aftershocks.

The temporary works were completed within three months, and were designed to accommodate a permanent solution. Crucially the library could be reopened, albeit without lift access. The careful sequencing of work restored one set of lifts after 19 months. The lift shafts were base isolated which was an unusual challenge

The work to remediate the damage was complex, but the University were focused on the best outcome for the building's long-term future.

The building is now fully base isolated, and the lift shafts move with the rest of the building during an earthquake. Additional seismic performance improvements have meant the building's resilience has been significantly improved.

Please contact our team to discuss how the Seismic Retrofit and Reuse can add value to your project:

Juliane Spaak
Technical Director –
Structural Engineering, Wellington, New Zealand
Contact +64 4 496 2538 or
juliane.spaak@beca.com

Jared Keen
Technical Director –
Structural Engineering, Christchurch, New Zealand
Contact +64 3 367 2448 or
jared.keen@beca.com