

MOVING TOWARDS CARBON NEUTRAL DESIGN BREAKING BOUNDARIES



BUCHAN NIKKEN

On the eve of Australia's parliament passing the first climate change legislation in a decade, global architecture design studio Buchan hosted a forum with Nikken Sekkei to explore the challenges and solutions to achieving carbon neutrality through design.

Harvey Male, Principal and Sector Leader at Buchan facilitated the session with subject-matter experts from Nikken Sekkei: **Ken Miyoshi**, Engineering Director, Global Design; **Kitaro Mizuide**, Principal, Building Services Group; and **James Scott Brew**, Senior Sustainability Architect.

Opening the forum, the panel noted the Australian Government's new targets to cut carbon emissions by 43% by 2030 (from 2005 levels) and net zero ambitions by 2050, with insights from Japan offering a glimpse into breaking boundaries to traditional thinking around energy and the built environment.

Carbon Trends in Japan

Ken Miyoshi, Engineering Director, Global Design highlighted that while some developers understand basic accounting principles around emissions, they are struggling to break the boundary between the utility grid, the building, and their tenants. Nikken is providing a holistic approach for both new and existing buildings in the form of energy audits, whole-life carbon analysis and green building certifications, as well as through the establishment of an embodied carbon calculation methodology.

Nikken is also developing an App for people to better understand personal carbon emissions associated with daily activities and lifestyle choices they make.

Recognising the boundary to break between built form and nature to enable an improved balance in energy performance, lower emissions, and wellness, **Kitaro Mizuide**, Principal, Building Services Group, shared how opening buildings to outdoor space can bring energy efficient, low-carbon solutions that in turn, offer greater choice in post-pandemic office and education space design. Solutions including natural ventilation, zero-energy climate design, and biophilic design strategies bring health and wellness benefits that improve human performance while reducing energy use and carbon emissions.

Resilient by Design

High-performance buildings improve resiliency by helping to keep buildings and infrastructure online to provide services that support people and business operations. **James Scott Brew**, Senior Sustainability Architect suggested that the climate crisis knows no boundaries, so new design rules are needed around how various risks to buildings and infrastructure are planned for. According to Brew, 'we can no longer design for a climate that doesn't exist'. The increased frequency and intensity of natural disasters is now something being planned for by using risk analysis that considers probability, scenarios, and impacts. Planning for flooding, increased or decreased rainfall, stronger wind loads, and heatwaves is now baked into design thinking.

Backcasting the Way Forward

Any plan to achieve zero carbon by 2050 needs to start there, at zero, and by applying strategies that gradually move backwards in time to today—with incremental reductions in carbon along the way, we can begin to see a path forward. For example, as energy grids get greener, by adding more renewable energy sources, buildings may be required to increase their demand response in line with the variability of the energy sources. This will require not only historical (local, climate-specific) architectural shading, orientation, and natural ventilation—allowing buildings to work more efficiently and in harmony with nature, but also active (controlled) demand responsive solutions.

People will also need to interact more with their buildings. Nikken Sekkei is exploring tools for real-time sensing and simulation to nudge people toward better comfort conditions or improved air quality in their workplaces. These kinds of tools can guide occupants to another floor level, area, or space to optimise building energy use while improving human health.

Whether focused on new buildings or the retrofit of existing buildings, energy efficiency, by design, continues to be the single most cost-effective way to drive down carbon emissions. As the energy efficiency of buildings improves, demand for energy falls, and buildings become more resilient as a result. Meanwhile, as the energy supply grid gets greener, buildings will also become less carbon intensive, and more responsive to energy supply and nature.

All of the technologies, tools, and techniques necessary to get to the goal of zero carbon are available today, many at a lower cost than not using them. The challenge remains in applying them effectively.

