

SG GREEN



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EXEMPLIFYING ENERGY EFFICIENCY

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EXISTING BUILDING PERFORMANCE: THE DECARBONISATION GOLDMINE

Retrofitting buildings can be challenging to get going, but doing so provides a business case relevant for the current times and addresses environmental needs



Existing Building Performance: the Decarbonisation Goldmine

To meet Singapore's national Net Zero by 2050 target, eliminating reliance on fossil fuels as an energy source is essential. However, Singapore is challenged by constraints around onshore renewable energy generation capacity, making full electrification of all assets as they currently perform challenging. For this reason, decarbonising the built environment requires an integrated approach that reduces energy use to as low as reasonably possible.

While that sounds straightforward, the goal is only the beginning of the process, says Mr. Freddy Toh, Technical Director of Cundall Singapore.

"Singapore already has the Singapore Green Plan 2030 target," he says. "But our challenge is while everybody knows about net zero, we need to know how to break that goal into achievable small steps and incrementally improve energy performance before we talk about net zero."

WHERE TO START

Mr. Marcus Kan, Managing Director of Cundall Singapore, says portfolio owners and asset managers often do not know where to start, how to start or what form staging of works should take.

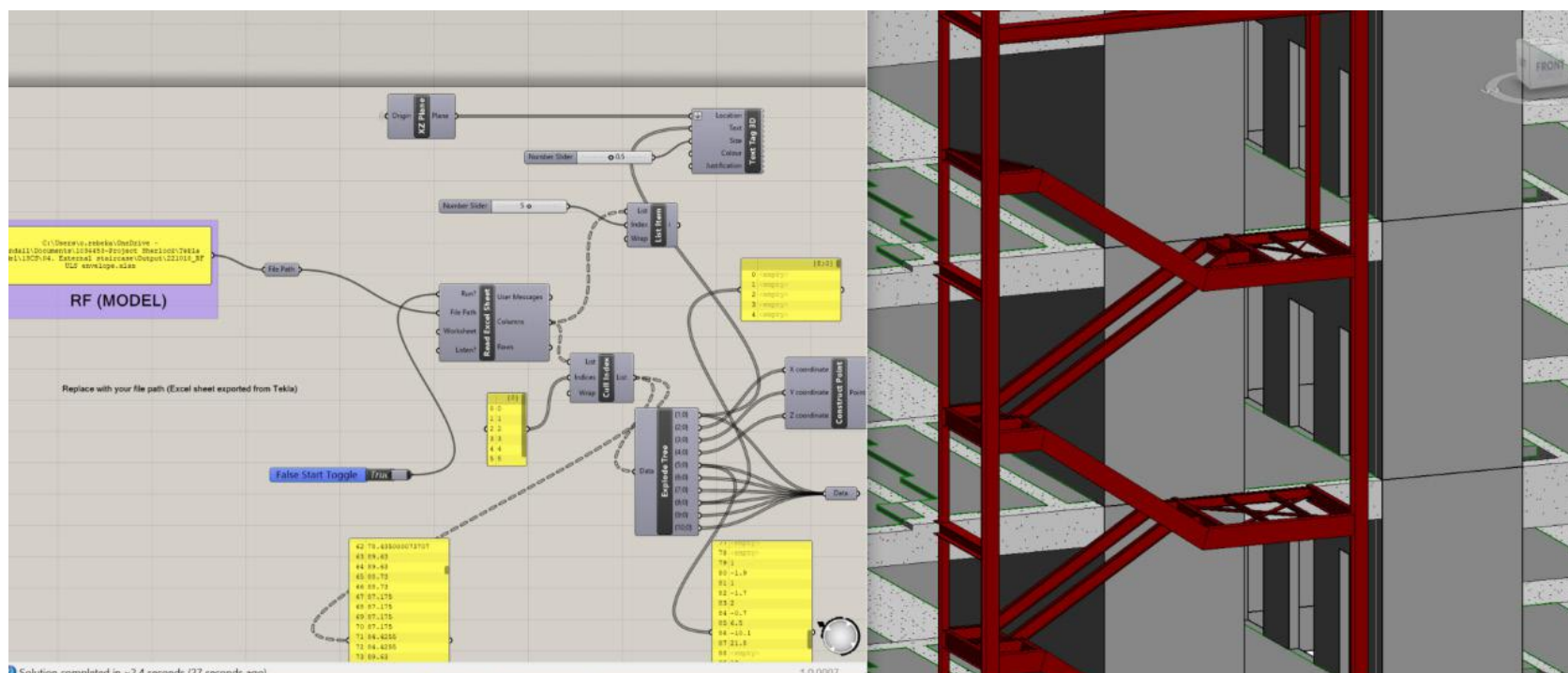
"For example, they might consider renewable energy, but not be aware that understanding how they use energy, and how to economise on that use, is generally the best place to begin."

Carrying out energy audits identifies what building systems are using energy and how much; and sets out opportunities for reducing that use. Organisations in Singapore who have taken this as a starting place for their net zero journey range from major blue chip corporate tenants through to clients with global asset portfolios such as DFS.



DFS Global Energy Audit - T Galleria by DFS Singapore

Existing Building Performance: the Decarbonisation Goldmine



In-house Parametric Script to Improve Design Efficiency of Proposed A&A Steel Structures

A sound strategy also maps out relevant works, the capital investment required and the operational cost savings each measure is expected to deliver.

Kan says we need to “squash the notion that we can only do better with new buildings and there is little that we can do with existing buildings.”

"Over 80 percent of the buildings that are projected to be still in use 30 years from now have already been built. If we are looking for bigger impacts in decarbonising, retrofitting existing buildings is a crucial task to support the overall goal."

RESPECTING EMBODIED CARBON

Upgrading existing buildings delivers a significant environmental win on two fronts: the reduction in emissions from energy use, and the retention of embodied carbon.

The embodied carbon emissions associated with the extraction, processing, manufacturing and transport of construction materials will become more significant in Singapore's national emissions footprint as more buildings become extremely efficient, explains Toh.

"In Singapore everything is imported, so embodied carbon is even more relevant," he says.

Structural engineer and Cundall Associate Director, Dr. Chaoming Yu, says minimising new material use is a primary driver for any structural engineering interventions in an existing property.

"We assess the existing structural capacity and work closely with the architects, using design modelling and optimisation to minimise material requirements."

Existing Building Performance: the Decarbonisation Goldmine

Engineering design for new elements also emphasises low-carbon materials, prefabrication to reduce construction waste, and bolted connections to ensure materials can potentially be dismantled and re-used in future.

THE RETROFIT GOLDMINE

From an environment, social and governance (ESG) perspective, existing buildings are a 'gold mine' for deriving tangible performance improvements and enhancing reputation for asset owners, investors and portfolio managers, says Mr. David Kim, Principal Sustainability Consultant of Cundall.

"Singapore is a prime candidate for emissions reductions and ESG gains through improving existing buildings as it has a significant tranche of existing buildings," Kim says.

Building Performance Services (BPS) is an integrated discipline that combines building services design engineering, building services commissioning and re-turning, and sustainability strategy, audits and certifications.

As a strategic and holistic approach to improving existing buildings it has delivered some significant results. Vicinity Centres in Australia is developing a net zero strategy across its portfolio. It has been recognised for the substantial energy use and emissions reductions achieved through engaging BPS with the #1 Ranking in GRESB for Listed retail Centres in Oceania in 2021.



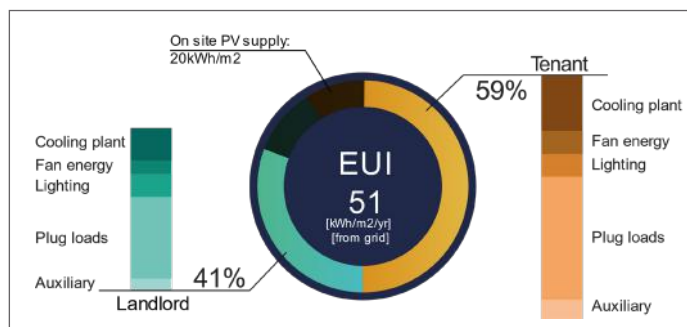
Vicinity Retail Portfolio NABERS rating - Chadstone, Australia © Aaron Pocock Photography

Existing Building Performance: the Decarbonisation Goldmine

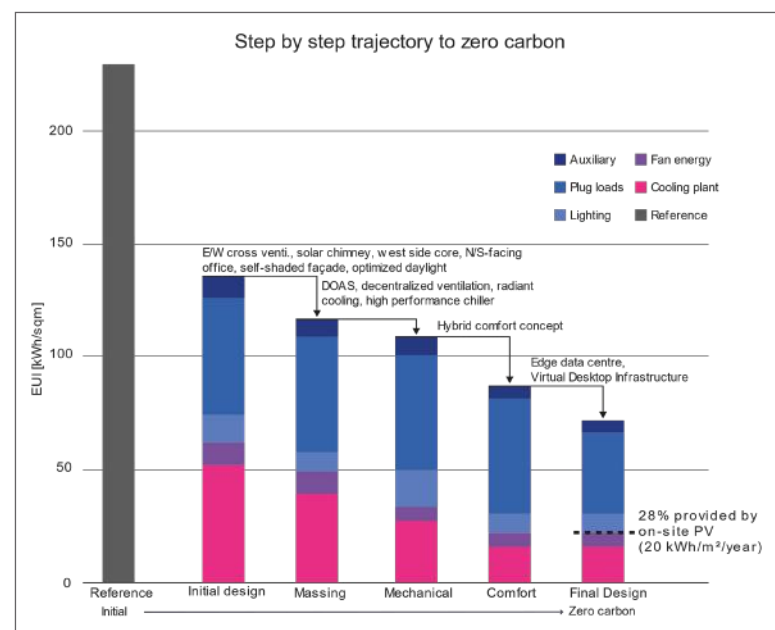


Treehouse, Hong Kong, China © Ronald Lu & Partners

We are evolving the performance-based thinking approach to inform the design stage for new buildings, as we did with the award-winning Net Zero Treehouse project in Hong Kong. By leveraging data on every aspect of operational energy use in developing the building services design, an ultra-low energy building was demonstrably achievable.



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Treehouse Energy Use Intensity © Ronald Lu & Partners and Cundall



Vicinity Retail Portfolio NABERS rating - Chadstone, Australia ©Aaron Pocock Photography

BUILDINGS WORK SMARTER, NOT HARDER

The process for portfolio-scale existing building enhancements to achieve meaningful OPEX reductions that represent a sound return for retrofit CAPEX spend, is informed by the initial energy audit and then enabled through strategic interventions including smart building technologies.

Smart building approaches also have a close alignment with the Building and Construction Authority's (BCA) Green Mark certification scheme, says Ms Annie Nguyen, Building Automation Associate Director from Cundall.

The scheme recognises the environmental win of retaining existing buildings through allocating higher points for existing building retrofits in key criteria of the Intelligence credit, she explains. These kinds of retrofits also align with the Singapore Smart Nation policy, ensuring no building is left behind. The value of smart buildings in terms of operational sustainability has also been recognised through the recent integration of the WiredScore framework with Green Mark.

Where there are existing controls and smart features, recommissioning is often the first step in the trajectory towards ultra-low energy buildings.



“Even for a conventional existing building, we need to consider the controls element as this is what drives optimisation for every piece of equipment and for monitoring how key equipment performs.”

Taking this a step further, where digital engineering design for structures and mapping of existing services is combined with the controls, automation and BMS solution, asset owners and managers can gain the benefits of an operational digital twin. This opens up further benefits for maintaining optimum performance through enabling improved maintenance, real-time analytics, exception and fault detection and diagnostics.

SHOW US THE DATA

Asset performance data produced by analytics and monitoring can also be published for stakeholders including investors and potential tenants, so there is transparency around building performance.

This may also enable asset owners to potentially obtain green finance options for upgrades to existing buildings. As Kim points out, the competitive interest rates offered by sustainability-linked loans and other financial products can potentially make a significant difference when considered across time and a substantial portfolio.

There are also social aspects to consider.

“Older buildings have a certain heritage value for the society they have served. Repurposing and transforming buildings, and increasing their value provides a business case relevant for the current times whilst addressing environmental needs,” Kan says.

“Corporates are racing to demonstrate results in their journey towards net zero carbon. They can make a significant contribution by playing a part in the transformation of an existing building to increase its value, and better meet their core requirements of an efficient, healthy and high-performing workplace.” ✔

**Article contributed by
Willow Aliento
Cundall**