

‘Like entering a forest’: Inside Asia’s largest timber building

Oscar Holland, CNN

Published 12:05 AM EDT, Mon June 5, 2023



NTU Singapore

Asia's largest wooden building, Gaia, has been unveiled in Singapore.

Singapore (CNN) — Singapore has long billed itself as a “garden city,” a term coined in the 1960s by the country’s founding father and former prime minister, Lee Kuan Yew. In the decades since, the island has embarked on extensive tree-planting programs and embraced so-called “biophilic” architecture, with greenery often seen creeping up urban facades or spilling out from skyscrapers.

A new six-story college campus building stands as Singapore’s latest ode to nature. Home to Nanyang Technological University’s (NTU) business school, the gently curved design features sunlit atriums, open-air study areas set against lush backdrops and elevators that descend into beds of tropical plants. Everything from handrails to benches, door frames to room dividers (and even an adjoining bus stop), were built using wood.

So, too, were the structural beams and columns. In fact, the building is made almost entirely from mass timber — a new generation of engineered wood, arranged in layers and bonded with strong adhesives, that is pushing the boundaries of architecture. Sprawling across 43,500 square meters (468,000 square feet), it is now Asia's largest timber building, by floor area.

Named Gaia, after the ancient Greek goddess of the Earth, the project opened in May and cost 125 million Singapore dollars (\$93 million) to build. Its exposed timber frame is free from cladding or paint, a design decision that celebrates natural materials while giving visitors the feeling of walking between trees.

According to the celebrated Japanese architect behind the project, Toyo Ito, this was precisely the point. "I always try to envision a connection with — and a feeling of — nature, such as trees and water, in my designs," he told CNN shortly after the building's inauguration ceremony. "The fact you mentioned that it feels like entering a forest shows that my vision came through."

Ito, who was awarded the Pritzker Prize (often dubbed the "Nobel" of architecture) in 2013, designed Gaia alongside Singaporean design firm RSP. It features a 190-seat auditorium and a dozen lecture theaters, as well as research facilities, faculty offices and airy study terraces.

Aside from toilets, ground-floor slabs and external staircases, which were built using concrete (in part due to local regulations), the structure was made with timber harvested from spruce trees in Austria, Sweden and Finland. The wood was prefabricated into panels and heavy-duty beams in Europe before being shipped to Singapore.





NTU Singapore

Set across 43,500 square meters (468,000 square feet) of space, Gaia will house Nanyang Technological University's business school.

Global trend

Recent years have heralded a huge increase in the number of large-scale wooden structures being built around the world. Some countries now even allow for high-rises (or “plyscrapers”), like Milwaukee, Wisconsin’s 25-story Ascent, which at 284 feet, is the world’s tallest mass timber structure.

Asian cities have often been slower to embrace the trend than European and North American ones. Singapore’s building codes only allowed timber architecture to rise to

24 meters (79 feet) at the time Gaia was approved, though this height restriction has since been lifted. But 81-year-old Ito believes attitudes are “changing rapidly” in Asia, adding: “Singapore is especially quick to make these things a reality.”

Singapore’s Building and Construction Authority (BCA) claims that using mass timber can reduce dust and noise at construction sites, while speeding up projects by as much as 35%. Counterintuitively, advocates for wooden buildings say they may also be safer — and less prone to catastrophic collapse — than steel-framed ones in a fire (though not all experts agree).

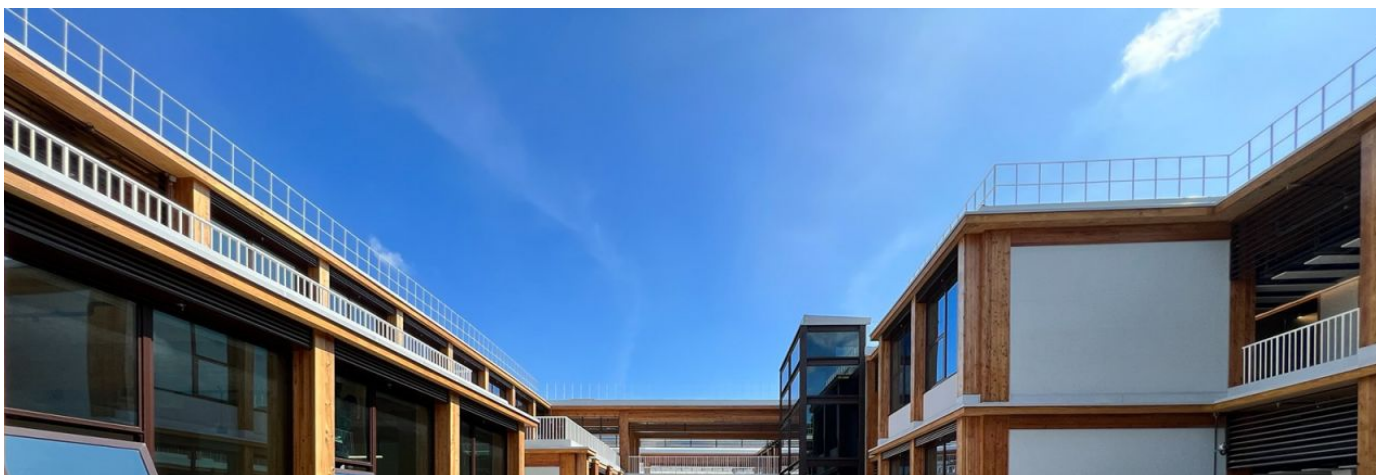
Advocates for mass timber point to the relatively slow and predictable rate at which the material burns. Gaia’s designers have also added a “sacrificial layer” of wood to the building’s beams that, in the event of a blaze, would char while protecting the timber beneath it.

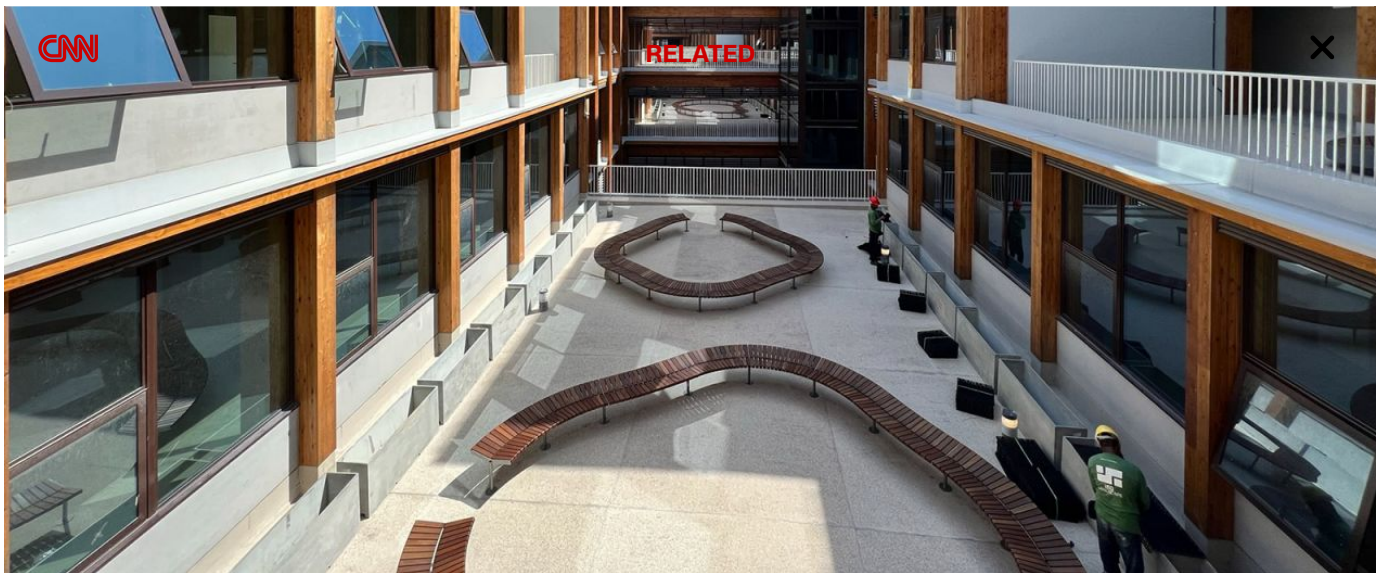
Many of the purported benefits of mass timber are, however, environmental.

Around 40% of the world’s energy consumption is attributed to the construction and operation of buildings. But unlike concrete and steel, whose energy-intensive production is responsible for a significant portion of buildings’ environmental footprint, trees absorb carbon dioxide throughout their lifetime.

If a tree is then turned into mass timber, this embodied carbon is sequestered, or “locked in,” rather than being returned to the atmosphere. Studies suggest that 1 cubic meter of wood can store about a ton of carbon dioxide.

Timber is also a natural insulator that, in warm places like Singapore, traps less heat than concrete ones (or reduces heat loss in colder climates). And while Gaia’s designers say they have not calculated the emissions saved during the construction process, they claim that, in operation, the structure produces 2,500 fewer metric tons of carbon dioxide than concrete or steel equivalents — an annual saving equivalent to taking over 550 cars off the roads.





NTU Singapore

Singapore has designated Gaia a "zero energy" building.

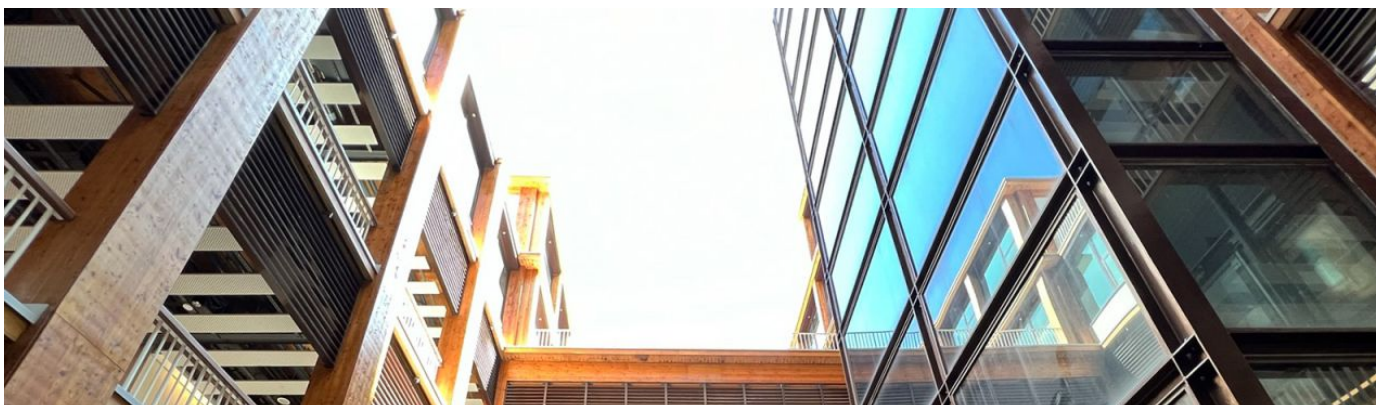
Passive cooling

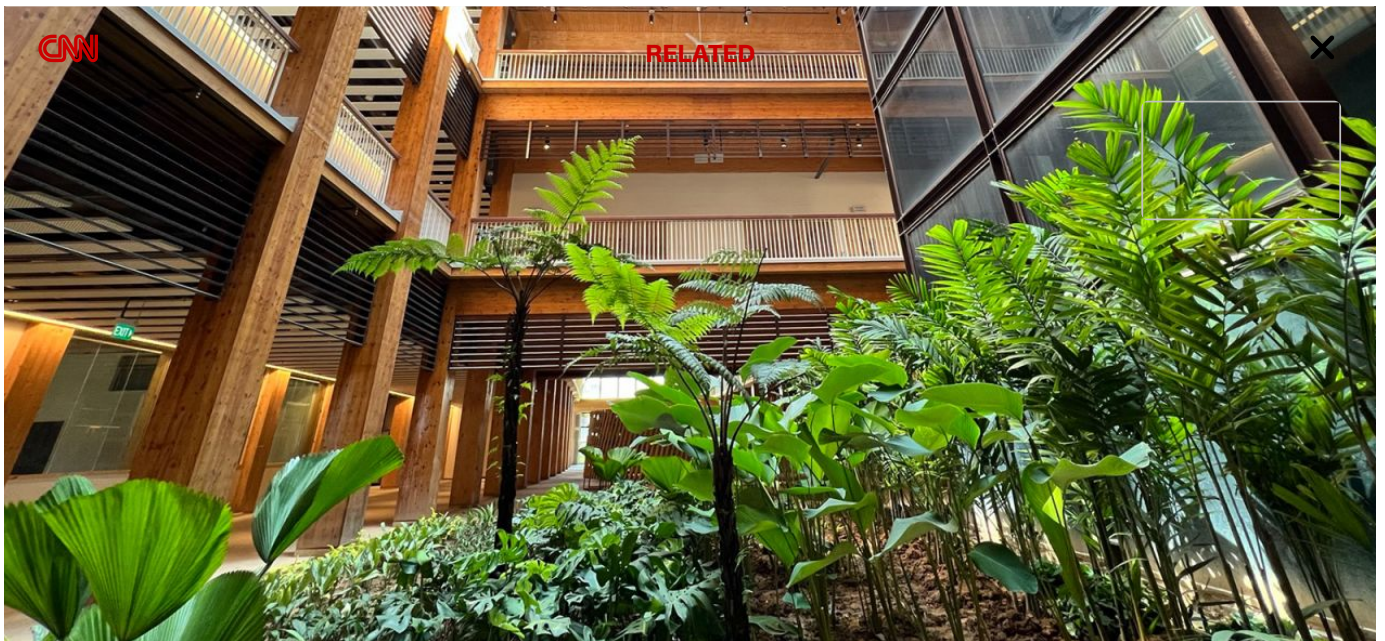
These energy savings are not just about materials. For one, the building's exterior features strategically placed fins that cast shade over the facade, helping to keep it cool.

Blasts of artificial air conditioning are also conspicuous by their absence.

Eschewing mechanical fans — some feat in a country less than 140 kilometers north of the equator — Gaia's AC system instead relies on "passive cooling," which pushes cold water through coils to chill the surrounding air. The breezy building's north-south orientation meanwhile encourages natural ventilation by aligning with the direction of Singapore's prevailing winds.

The country's authorities have designated Gaia as a "zero energy" building that (with the help of rooftop solar panels) produces as much energy as it consumes. To date, just 16 structures in Singapore have achieved this distinction — and, now, precisely half of them are NTU properties, including a campus sports hall, also designed by Ito.





NTU Singapore

Airy terraces and sunlit atriums are found throughout the design.

At the building's opening, the university's president Ho Teck Hua used his speech to boast of having the "greenest campus in Singapore."

Quite what the business school's students make of their new home remains to be seen — classes don't begin here until the new academic year starts in August. But there is a growing body of evidence suggesting that using wood in architecture can have a positive impact on occupants' well-being, including reduced stress levels.

Ito, whose grandfather was a lumber dealer, said that his design ethos remains underpinned by the comfort of those who use his buildings.

"I always consider comfort," he explained. "(If a building is comfortable), people will stay in the space and visit every day. I want to create architecture that gives people the will to live."

CNN's Mayumi Maruyama contributed to this report.