# Twin Pine Towers

Advance Net Zero Ideas Competition
New Building Category
ID:185792

**Description of key ideas**

The ‘Oxford House meets Pines...’ proposal explores three key ideas to achieve advance net zero sustainability. Inspired by nature, the proposal investigates the heat and humidity regulating properties of pine cones. Using a **biomimicry** approach to form a pine cone inspired kinetic facade. The proposal takes advantage of minimal changes to the existing building, keeping the existing structure and curtain wall. The strategy removes all decorative fins and features to be replaced with a **kinetic protective facade**. Such a barrier is based on a modular approach to increase its feasibility for easy construction and management. Furthermore, **AI optimization** has been studied to optimize the kinetic facade specified to on site microclimates.

**Goals**

The primary objective is to explore the viability of protected green atrium between twin towers in Hong Kong. Secondary goals include an idea on kinetic facade with the biggest repeatability on other projects. There are many curtain wall office towers in Hong Kong, many of which have an upstand edge beam on the interior. The module will have fixings to the spandrel zone and works with a standard 1.5m mullion grid. Such a kinetic system will have room for AI optimization inorder for it to most efficiently adapt to every mico-climate and location.

**Assumptions**

In order for the project to maximize its conceptual value, several assumptions have been made. First of all, the building code would have to allow projections beyond the curtain wall, such projections would be GFA non accountable for its feasibility. The green atrium between the two buildings will also not account for any GFA. Secondly, construction details and technicalities would be resolved in later stages. Lastly, a speculation in material advancements with strategic replacement changes would greatly increase performance results.

**Advancing Net Zero**

Most energy use in office towers in Hong Kong owe to air conditioning. In order to reduce indoor temperature, the kinetic facade aims to reduce direct solar radiation, thus reducing cooling demands. At the same time, each individual module would be made of lightweight materials to minimize its embodied carbon. This includes production energy, energy required for operating the kinetic movements. The module itself being lightweight would reduce its carbon footprint from shipping impacts. Furthermore, traditional towers do not have solar panels due to their high roof to facade ratio, not to mention rooftops are conventionally placed with cooling towers. By creating horizontal modules, the tower has a significant

increase in upward facing areas, solar energy is absorbed and reflected on the exterior of the building without increasing interior heat gains.

**Targeted EUI achieved**

A total of 20% reduction in overall Energy Saving is expected from this proposal. The facade improvements combined with optimized shading alone would expect a 10% reduction in energy saving. Further improvements to HVAC system by harvesting rainwater would increase energy savings by another 5%. On-site renewable energy from photovoltaic combined with lighting improvements and battery storage would account for the remaining 5% .

**Life cycle stages**

The design considers all stages of the life cycle with its core principle in using the least materials for the greatest benefit. A simple intervention backed with thoughtful design consideration whilst being optimized with computation technologies. The module itself being lightweight and made of recyclable materials would have significant effects from extraction to end of use treatments. The main material being PVC vinyl membrane has an embodied carbon of 2.6 kgCo2/kg. Facade and structural materials are assumed to be typical standards.

**Significance of joining the competition**

The project aims to provide for more than its Oxford House occupants, the pine cone and iconic facade is a symbol for sustainable change in Hong Kong. With proper pairing of sensors, each module can now be individually optimized and controlled through computational methods and can be adopted as early as the design concept stages. By joining the ideas competition, I intend to increase my own awareness of the environmental benefits of double skin facades and disseminate such knowledge to the world. This is also a chance to call for a review on the building code for protective projectiles and green atriums.