Ahead of the curve

NTU is a trailblazer when it comes to zero-energy buildings

BY MICHELLE BONG

In line with a push for sustainability, the Government aims to quadruple the number of construction projects that produce energy efficient buildings by 2020.

But Nanyang Technological University (NTU) has raised the bar in more ways than one. Its original promise was to create new or upgrade existing zero-energy buildings (ZEB) by 2023 — which would allow their entire energy consumption to be supplied by renewable sources.

However, it has already upgraded seven of them this year — all of which have won Building and Construction Authority (BCA) awards this year.

These include the university's Nanyang Auditorium, administration building, student activities centre Nanyang House and sports hall The Wave, the first large-scale mass-engineered timber building in South-east Asia.

Trailblazing the way

The university currently holds the national record of 57 Green Mark-certified building projects comprising more than 230 buildings, of which 95 per cent are certified Green Mark Platinum — the highest award for sustainable building design in Singapore from BCA.

Its Office of Development and Facilities Management (ODFM) chief executive officer Paul Chain explains that zero-energy building designs are the way forward as the battle against global warming rages on.

He says: "A ZEB will harvest renewable energy such as the free solar energy to provide electrical power to the building, which would otherwise require burning fossil fuels, thereby reducing global warming."

From top: NTU's zero energy buildings The Wave; Wee Kim Wee School of Communication and Information; and Nanyang Auditorium. PHOTOS: NTU

The impressive feat of upgrading seven buildings so far was made possible by the collective efforts of various stakeholders. ODFM spearheaded the upgrading to ZEB and Green Mark Platinum Buildings by determining the type of system to be upgraded for maximum energy savings with significant returns on investment. Consultants were then employed, and contractors were tasked with the implementation.

Impactful upgrading work include Passive Displacement Ventilation, LED Task Lighting, Automatic Fume Cabinet Sash Closers, Inline Pumping, Photovoltaic Cells, Demand Control Ventilation, and Smart Integrated Building Management System. Today, NTU has reduced its power consumption intensity by about 28 per cent compared with 2011 consumption. For the seven ZEBs, the reduction is 42 per cent.

Laying the groundwork

It took five years for these seven projects to become a reality — from conceptualisation to construction. They were overseen by ODFM's sustainability efforts led by Mr Tong Kok Kwang, who was assisted by Dr Ji Xiao Na.

Says Mr Chain: "We selected proven professionals from the industry who are innovative and dynamic to work on the new systems. For phenomenal results, we need to go beyond conventional designs; one such example is the team's proposal to use a passive displacement ventilation system, which saves almost 15 per cent of energy for a typical building."

The projects were not without challenges. The team led by Mr Tong and Dr Ji faced a common energy management challenge: the lack of data because there were insufficient sub-meters to track energy consumption by systems and areas.

The team overcame this by compiling statistical data of building types made available by some institutions and government bodies. It then focused on trimming energy consumption of major systems or equipment with bigger potential savings. Careful planning and execution was needed so as not to disrupt building operation.

Mr Chain is of the view that if NTU can do it, so can others. He adds: "NTU has a very able and committed team of people focusing on sustainability. ODFM is happy to share with all willing to learn about its journey and experience."

Despite these groundbreaking achievements, NTU is not resting on its laurels. Plans are already in place for new ZEBs by 2021.