

JOINT MEDIA RELEASE

FROM ZERO TO POSITIVE: BCA PARTNERS SINBERBEST TO TRANSFORM ZERO ENERGY BUILDING INTO A POSITIVE ENERGY BUILDING

- *Existing Zero Energy Building to be further retrofitted to achieve a net surplus energy of at least 40%, and improve energy efficiency by at least 20%*

Singapore, 2 July 2017 – The Building and Construction Authority (BCA) is partnering with the Singapore-Berkeley Building Efficiency and Sustainability in the Tropics (SinBerBEST), a research entity under the National Research Foundation CREATE Programme, to embark on a major research collaboration to significantly transform BCA's Zero Energy Building (ZEB) into a positive energy building which serves as a unique living laboratory for smart building technologies, or an "Office of the Future".

2. The current ZEB, which has already been recognised as one of the most energy efficient buildings in Singapore with stellar energy efficiency, 50% better than a code-compliant building, will push its boundaries further. The energy efficiency of ZEB will be enhanced to achieve a further 20% improvement over the current level. Together with the upgrading of the existing solar photovoltaic system, the building will be able to achieve an overall energy surplus of at least 40%.

3. BCA will partner with SinBerBEST researchers and industry stakeholders to design and incorporate the latest energy efficient technologies to address the positive energy challenge. Arising from years of R&D at UC Berkeley and local universities, more than 20 innovative building technologies, covering air-conditioning, lighting, façade, smart controls, etc, will be engineered and tested in the refurbished building.

4. In particular, this project places great emphasis on smart building technologies. Enabling technologies at user level, such as occupancy positioning, personalised environment setting, plug load monitoring and control, etc. will be streamlined into the infrastructure of the office space. The space will be equipped with more than 1,000 sensors and monitoring devices, which is triple the number in the current ZEB, providing real-time feedback of its occupants' activities to a dedicated smart building management system (BMS). This BMS interacts with the deployed technologies, collect data and carry out analytics, and then adjust the building systems to deliver an indoor environment that optimises the energy usage of the space as well as the experience of its occupants (More details in Infographic).

5. The refurbished ZEB will also aim to provide an adaptable, smart, biophilic and healthy office environment for its occupants. Biophilic and ergonomic design will be systematically implemented through a collaborative and integrated design-thinking process with deep end-user engagement. With the integration of software, hardware, and people elements during this process, the "Office of the Future" will be an exemplary model for the design of smart and healthy buildings for occupants.

6. The project is expected to be completed by the end of 2018.

7. Commenting on the project, SinBerBEST Program Leader Prof Costas Spanos said, "One of our key philosophies at SinBerBEST, is that the modern built environment can benefit from an integrated approach that blends design, building science and information technology in order to improve the efficiency and the quality of the built environment. The SinBerBEST team is very excited about this unique opportunity to partner with BCA and demonstrate some of our key inventions in a true living laboratory, embedded into one of the most advanced buildings in the world."

8. BCA's Chief Executive Officer, Mr Hugh Lim said, "Since its launch in 2009, BCA's flagship ZEB has delivered a net zero energy performance for seven continuous years, producing more energy than it consumes with a net surplus of between 7- 9% achieved on a yearly basis. With the technological advancements in the past 7 years, it is opportune for ZEB to undergo a technology refresh, so it continues to serve as an effective living testbed for energy efficiency in buildings.

9. “This project signifies BCA’s commitment to continued innovation, creating a model of positive energy low-rise building that provides a healthy and conducive working environment for occupants. This is in line with BCA’s long term aspiration of achieving ‘positive energy low-rise, zero energy mid-rise and super low energy high-rise buildings’ in the tropics.”

10. The Research Collaboration Agreement was signed and exchanged between BCA and SinBerBEST on 29 June during the Ministry of National Development (MND) Urban Sustainability R&D Congress 2017 held at Suntec Singapore Convention & Exhibition Centre.

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About BCA

The Building and Construction Authority (BCA) of Singapore champions the development of an excellent built environment for Singapore. BCA’s mission is to shape a safe, high quality, sustainable and friendly built environment, as these are four key elements where BCA has a significant influence. In doing so, it aims to differentiate Singapore’s built environment from those of other cities and contribute to a better quality of life for everyone in Singapore. Hence, its vision is to have "a future-ready built environment for Singapore". Together with its education arm, the BCA Academy, BCA works closely with its industry partners to develop skills and expertise that help shape a future-ready built environment for Singapore. For more information, visit www.bca.gov.sg.

About SinBerBEST

SinBerBEST is an NRF-funded R&D program hosted by University of California Berkeley (UCB) with National University of Singapore (NUS) and Nanyang Technological University (NTU) as main partners and headed by Prof Costas Spanos. It is one of the two core research programs within Berkeley Education Alliance for Research in Singapore (BEARS). Established in 2011 by UCB as a non-profit company that function as a centre for research, graduate education, and innovation. Its mission is to advance technologies for designing, modelling and operating buildings for maximum efficiency and sustainability in tropical climates. Its research is focused on building energy technologies for the tropics, with a niche expertise in smart building technologies, lighting and data analytics. For more information on the SinBerBEST program, please visit www.SinBerBEST.Berkeley.edu.

AT A GLANCE: KEY TECHNOLOGIES IN POSITIVE ENERGY ENHANCEMENT FOR ZEB

Dimmable Task Lamps

Lighting system for energy usage monitoring and integration of PoE*-based dimmable task lighting to minimise energy use.

*PoE: Power over Ethernet

Demand Controlled Ventilation System

A smart system to provide automatic adjustment of the space cooling and ventilation requirement according to the occupants' needs.

Impact: Potential cooling energy savings – 15 to 20%

Elevated Air Movement: Ceiling Fan

A smart ceiling fan operates when the air-conditioning system set-point temperature is increased from standard 24°C to 26 - 28°C, providing better air distribution uniformity.

Impact: Potential cooling energy savings – 20 to 25%

High Performance PoE-based Dimmable Ceiling Luminaire + Lighting Control

Lighting system to be powered through ethernet to minimise energy use rather than normal power cabling

Impact: Potential lighting energy savings up to 30%

Double Skin Façade

High performance façade system that reduces operational energy use i.e. cooling energy use.

Elevated Air Movement: Personal Desk Fan

Personalised cooling to individual user when the main air-conditioning set-point temperature is increased from standard 24°C to 26 - 28°C.

Impact: Potential cooling energy savings – 20 to 25%

User Personal Space Settings

Provides allocated personal space information such as present temperature, brightness and CO₂ level.

Impact: Greater user control to manage personal space according to user's preference

Plug Loads Management System

Monitors plug-load energy consumption of each occupant and to understand the usage pattern, and reschedule operation of plug-load to reduce energy wastage.

Impact: Potential overall energy savings – 5 to 10%

Wifi-based Occupancy Monitoring System

Provides real-time occupancy level and occupancy distribution (via WiFi-enabled mobile devices) to help manage the energy consumption from the air-conditioning system, lighting and plug load technologies.

Impact: Potential overall energy savings – 10 to 15%

