

MEDIA RELEASE

BCA SKYLAB WINS PRESTIGIOUS ENGINEERING ACHIEVEMENT AWARD ON FIRST YEAR ANNIVERSARY

Singapore, 20 July 2017 – The BCA SkyLab, which is celebrating its first anniversary, has been accorded the IES Prestigious Engineering Achievement Awards 2017, at the World Engineers Summit 2017 Conference.

Ongoing research and testing projects at BCA SkyLab

2. BCA SkyLab is a state-of-the-art testbed for energy-efficient technologies in façades, air-conditioning, lightings and controls. Sitting atop a 7-storey building with a 360-degree rotatable platform, it conducts tests under “real-world” conditions at any desired building orientation. The BCA SkyLab serves as a key national infrastructure for the built environment industry and research community to co-innovate green building technologies.

3. Since its launch on 20 July 2016, the BCA SkyLab has embarked on research and testing projects on four emerging energy efficient technologies, namely automated reflective blinds, chilled beam, smart lighting, and thermochromic/electrochromic glass (More details in Annex A). Funded by the National Research Foundation, these projects are carried out by BCA’s Built Environment Research and Innovation Institute (BERII) and Energy Research Institute at Nanyang Technological University (ERI@N) in collaboration with the Lawrence Berkeley National Laboratory (LBNL). Industry partners are actively engaged in the design of experiment and development of solutions.

4. BCA SkyLab recently concluded a study on integrated lighting solutions using automated reflective blinds with LED dimming control. The integrated system automatically adjusts the angle of the blinds according to the weather conditions to allow maximum daylight penetration. It helps to effectively cut down the discomfort from glare and saves energy through digital lighting dimmers. It was found that in the tropical climate,

the use of the dimmable LED lighting with automated reflective blinds is able to achieve lighting energy savings of up to 74% compared to conventional T5 lights with manual blinds down and no dimming control. Specifically, the testing on the use of smart lighting showed that one could save up to 47% of lighting energy by using daylight-responsive dimming control as opposed to using conventional lighting which does not make use of daylighting. The rotatable BCA SkyLab allows testbedding in different orientations, and the study also showed that the lighting energy savings varied according to the window facing and solar angles. For example, the measured energy savings is 17% greater when the test rooms are facing north compared to when they are facing east.

5. “This study, for the first time, quantifies the potential energy savings by the integrated technologies of lighting control and automated shading/daylighting control in buildings in Singapore. It provides valuable insights for technology suppliers, consultants and building owners in developing and adopting these technologies in our local context, which may subsequently be incorporated in the BCA Green Mark standard”, said NTU Associate Professor Wan Man Pun, principal researcher of the study. “We are encouraged by the results and the capabilities demonstrated by the BCA SkyLab during the study. Such findings could add value to academia and the industry in Singapore and in the region, potentially spurring more innovations within the R&D community,” added Assoc Prof Wan, who is also Assistant Chair of Research at the School of Mechanical & Aerospace Engineering, NTU.

6. Local company Automated Lifestyle was involved in the study, by designing, supplying and installing the automated blinds system.

Future plans

7. More than 20 organisations, comprising research institutions and industry players such as Singapore developer CapitaLand, have expressed strong interest in testing the latest building technologies such as cool construction materials to reduce the ambient temperature at the BCA SkyLab over the next two years.

8. Moving forward, both LBNL and BCA SkyLab plan to continue their collaboration in R&D and knowledge sharing. Researchers and technologists are interested in comparing technology performance in different climatic conditions, such as energy-efficient windows and facades, and to further improve these technologies to suit our local

climate. The testing collaboration between BCA SkyLab and LBNL's FLEXLAB would greatly benefit the industry and research communities of both countries in their push towards driving greater energy efficiency in buildings.

9. The BCA SkyLab will test emerging technologies that will eventually find their way in our offices, schools, homes and public amenities. This includes innovative Building Integrated Photovoltaic (BIPV) technologies with clear glass, smart air-conditioning technologies using model predictive control (MPC), and many others.

10. Commenting on the future role of the BCA SkyLab, Mr Lam Siew Wah, Managing Director, Built Environment Research Innovation Institute (BERII), said: "We are very pleased that the BCA SkyLab, on its first anniversary, has been recognised through being selected for the IES Prestigious Engineering Achievement Awards 2017. The BCA SkyLab will continue to support the emerging and evolving research needs of the built environment industry. We will continue to provide a "real-world" test on the latest green building technologies for the tropics and to accelerate their adoption in order to maximise energy savings. In doing so, we also hope to enhance Singapore's R&D in building energy efficiency to support our ambition of having Positive Energy Low rise, Zero Energy Medium rise and super Low Energy High rise buildings for the Tropics."

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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.

Annex A – Fact sheet on four emerging technologies in BCA SkyLab

Since its launch in July 2016, the BCA SkyLab has embarked on research projects on four emerging energy efficient technologies, namely automated blinds, chilled beam, smart lighting and thermochromic/electrochromic glass. Below is a summary of the technologies:

S/N	Technology	Description	Potential impact/benefit
1	Automated reflective blinds with dimmable LED lighting system	<ul style="list-style-type: none"> The study investigates the lighting energy performance and visual comfort of several lighting and daylighting technologies: LED, auto-dimming lighting and automated reflective blinds. 	<ul style="list-style-type: none"> The use of the dimmable LED lighting with automated reflective blinds is able to achieve lighting energy savings of up to 74% compared to T5 lights with manual blinds down and no dimming control, while effectively eliminating the glare discomfort. This could be potentially applied to different types of spaces, such as offices, classrooms, living areas, etc.
2	Chilled beam	<ul style="list-style-type: none"> Chilled beam is an innovative and energy-efficient technology in air-conditioning. It provides radiant and convective cooling via circulated cool water within its cooling coil. Unlike conventional fan coil unit, the chilled beam system does not have a built-in fan and hence saves energy. 	<ul style="list-style-type: none"> Compared to a conventional system, this system can achieve higher energy savings by reducing the fan power and refrigeration energy. It also requires little maintenance as there are no moving parts.

3	Smart Lighting	<ul style="list-style-type: none"> • Smart lighting uses sensors to automatically adjust the brightness of the artificial lights according to the presence of the occupants and current ambient environment 	<ul style="list-style-type: none"> • The result shows that with just using daylight dimming control with T5 fluorescent lamps, we could save up to 47% lighting energy savings compared to T5 fluorescent lamps with no smart lighting and daylight dimming control. More energy savings potential can be achieved when combined with automated shading control.
4	Thermochromic/electrochromic glass	<ul style="list-style-type: none"> • A thermo-chromic glass is a self-tinting and heat responsive glass technology for optimal lighting and heat moderation. The electrochromic glass can change transmittance based on ambient environment conditions, occupant thermal or visual comfort etc. 	<ul style="list-style-type: none"> • This technology helps to reduce solar heat gain into the space; hence, saving on energy for air-conditioning. It offers the potential to improve the visual comfort and thermal comfort experienced by occupants of the space.