GREEN BUILDINGS INNOVATION CLUSTER

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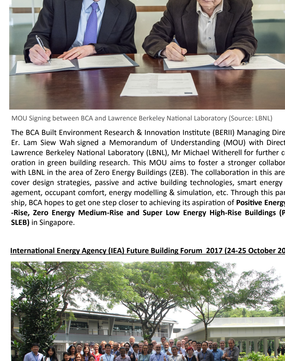
Green **B**uildings **I**nnovation **C**luster (GBIC) is supported by National Research Foundation (NRF) fund as a one-stop integrated Research, Development and Demonstration hub to **experiment**, **exhibit**, and **exchange** knowledge of promising building energy efficient solutions

BCA Partners Lawrence Berkeley National Laboratory for A Greener Built Environment (14 November 2017)



MOU Signing between BCA and Lawrence Berkeley National Laboratory (Source: LBNL)

The BCA Built Environment Research & Innovation Institute (BERII) Managing Directory Er. Lam Siew Wah signed a Memorandum of Understanding (MOU) with Director of Lawrence Berkeley National Laboratory (LBNL), Mr Michael Witherell for further collaboration in green building research. This MOU aims to foster a stronger collaboration with LBNL in the area of Zero Energy Buildings (ZEB). The collaboration in this area will cover design strategies, passive and active building technologies, smart energy management, occupant comfort, energy modelling & simulation, etc. Through this partnership, BCA hopes to get one step closer to achieving its aspiration of **Positive Energy Low -Rise, Zero Energy Medium-Rise and Super Low Energy High-Rise Buildings (PE-ZE-SLEB)** in Singapore.

International Energy Agency (IEA) Future Building Forum 2017 (24-25 October 2017)

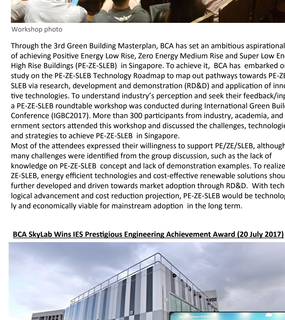
Future Building Forum group photo

The International Energy Agency (IEA) Future Buildings Forum (FBF) Think Tank Workshop 2017 was organised by the BCA and NUS, in collaboration with the IEA Energy in Buildings and Communities (IEA-EBC). A total of 34 delegates from the IEA-buildings related Technology Collaboration Programmes[1] (TCPs) and 69 from the Singapore community attended the FBF.

This two-day workshop discussed the various challenges, opportunities and R&D priorities to transform cities in hot and humid climates towards more efficient and sustainable energy use. Many challenges to implementation surfaced from the parallel discussions, such as the absence of information and the need for government intervention. However, opportunities presented where leadership from both government and industry can play a major role in rolling out policies, standards and guidelines, financial frameworks and development of deployment roadmaps. Most importantly, the R&D priorities for various IEA TCPs have been identified in their strategic plans for the next five years, which include embodied energy and embodied greenhouse gas emissions for buildings, ventilative and personalised cooling, low energy dehumidification, smart and predictive control, net zero energy buildings, and occupant health, well-being and thermal comfort.

[1] Technology Collaboration Programmes (TCPs) are independent, international groups of experts that enable governments and industries from around the world to lead programmes and projects on a wide range of energy technologies and related issues. Their topics include efficient energy end-use, renewable energy, fossil fuels, etc. The 39 TCPs operating today involve about 6000 experts from government, industry and research organisations in more than 50 countries.

PE-ZE-SLEB Roundtable Workshop (14 September 2017)

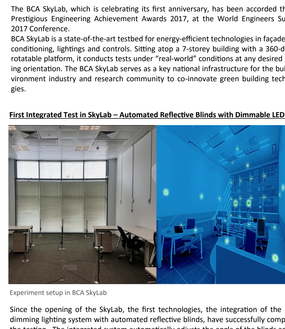


Workshop photo

Through the 3rd Green Building Masterplan, BCA has set an ambitious aspirational goal of achieving Positive Energy Low Rise, Zero Energy Medium Rise and Super Low Energy High Rise Buildings (PE-ZE-SLEB) in Singapore. To achieve it, BCA has embarked on a study on the PE-ZE-SLEB Technology Roadmap to map out pathways towards PE-ZE-SLEB via research, development and demonstration (RD&D) and application of innovative technologies. To understand industry's perception and seek their feedback/inputs, a PE-ZE-SLEB roundtable workshop was conducted during International Green Building Conference (IGBC2017). More than 300 participants from industry, academia, and government sectors attended this workshop and discussed the challenges, technologies and strategies to achieve PE-ZE-SLEB in Singapore.

Most of the attendees expressed their willingness to support PE/ZE/SLEB, although many challenges were identified from the group discussion, such as the lack of knowledge on PE-ZE-SLEB concept and lack of demonstration examples. To realize PE-ZE-SLEB, energy efficient technologies and cost-effective renewable solutions should be further developed and driven towards market adoption through RD&D. With technological advancement and cost reduction projection, PE-ZE-SLEB would be technologically and economically viable for mainstream adoption in the long term.

BCA SkyLab Wins IES Prestigious Engineering Achievement Award (20 July 2017)

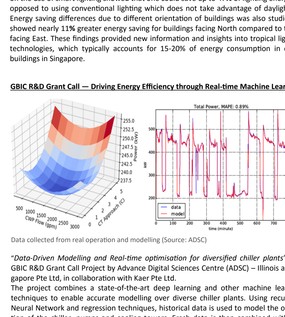


Picture of BCA SkyLab and IES Prestigious Engineering Achievement Awards Ceremony

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.

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.

First Integrated Test in SkyLab – Automated Reflective Blinds with Dimmable LED Lights



Experiment setup in BCA SkyLab

Since the opening of the SkyLab, the first technologies, the integration of the auto-dimming lighting system with automated reflective blinds, have successfully completed the testing. The integrated system automatically adjusts the angle of the blinds according to the weather conditions to allow maximum daylight penetration.

It was found that this integrated system effectively eliminates any glare discomfort. It is also able to achieve up to 74% savings off the energy used by a lighting system that relies on manual window blinds and non-dimmable fluorescent tubes. Specifically, testing on the use of smart lighting showed that one could save up to 47% of lighting energy, as opposed to using conventional lighting which does not take advantage of daylighting. Energy saving differences due to different orientation of buildings was also studied. It showed nearly 11% greater energy saving for buildings facing North compared to those facing East. These findings provided new information and insights into tropical lighting technologies, which typically accounts for 15-20% of energy consumption in office buildings in Singapore.

GBIC R&D Grant Call — Driving Energy Efficiency through Real-time Machine Learning

Data collected from real operation and modelling (Source: ADSC)

"*Data-Driven Modelling and Real-time optimisation for diversified chiller plants*" is a GBIC R&D Grant Call Project by Advance Digital Sciences Centre (ADSC) – Illinois at Singapore Pte Ltd, in collaboration with Kaer Pte Ltd.

The project combines a state-of-the-art deep learning and other machine learning techniques to enable accurate modelling over diverse chiller plants. Using recurrent Neural Network and regression techniques, historical data is used to model the operation of the chiller, pumps and cooling towers. Fresh data is then combined with the models to establish optimal settings for the chiller plant, even when the behavior of the chiller plant is slightly different due to aging equipment and cooling load variance. The models for different equipment are also used to predict equipment performance, and minimize the overhead of equipment servicing and replacement.

With the backing of a key industry collaborator in Kaer, this proactive model is currently being tested at 4 locations; Insead, Orchard Tower, China Town Point and AMK 7000. The system has been tested on a highly efficient chiller plant (0.6 kW/RT). It can consistently save over 5% of power consumptions while delivering satisfactory cooling service to the buildings.

BCA Green Buildings Innovation Cluster (GBIC)

If you have any feedback and suggestions, please contact us:
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Visit our website below for more information.
http://www.bca.gov.sg/ResearchInnovation/gbic.html

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