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Circular to Professional Institutes / Associations

Dear Sir/Madam

BCA-KEPPEL LAND JOINT CHALLENGE CALL FOR TEST-BEDDING OF SUSTAINABLE SOLUTIONS

Background

1. Guided by the long-term aspiration of Positive Energy Low-rise, Zero Energy Medium-rise, Super-low Energy High-rise Buildings for the tropics, BCA's Green Buildings Innovation Cluster (GBIC) was set up as a one-stop research, development and demonstration (RD&D) hub that experiments, exhibits and exchanges knowledge of promising energy efficient solutions with industry stakeholders.

2. To push the envelope and accelerate the adoption of promising building energy-efficient technologies and solutions in the industry, BCA and Keppel Land Ltd (KLL) will jointly launch an inaugural Challenge Call inviting companies to submit proposals on sustainable technologies for test-bedding in one of KLL's developments, **Keppel Bay Tower**.

Objective

3. The Challenge Call aims to call on building owner, technology providers and researchers, to establish partnership to test and showcase innovative and sustainable green building technologies. In doing so, we hope that these demonstrated technologies, if successful, would be replicated in other buildings and eventually scaled up for wide adoption.

Scope of Challenge Call

4. The applicant's proposal should include innovative emerging technologies that will help to reduce building landlord's energy consumption (e.g. façade, chillers, AHUs, BIPV, energy management systems, etc.), as well as solutions that will reduce tenants' energy usage (e.g. lightings, plug loads, etc.) beyond Green Mark Platinum Standard.

Application

5. Interested applicants are invited to submit their proposals through email and required to **(i) fill up the Challenge Call application form**, and **(ii) attach the required supporting documents** such as technical specification, product brochures, past/on-going project references, etc. and submit via email at BCA_Challenge_Call@bca.gov.sg by **7 Jul 2017 at 1700 hours** (Singapore time)

6. Full details of the challenge call including the application form can be found at BCA GBIC website at <https://www.bca.gov.sg/ResearchInnovation/gbic.html>

7. A briefing session will be conducted in on **9 June 2017 (Friday)** at **1000 hours** at the **Function Room, Block A, Level 1, BCA Academy, 200 Braddell Road, Singapore 579700.**

8. To register your interest to attend the briefing, please email to the GBIC Secretariat at BCA_Challenge_Call@bca.gov.sg

Yours faithfully,



TAN TIAN CHONG
DEPUTY MANAGING DIRECTOR
BUILT ENVIRONMENT RESEARCH AND INNOVATION INSTITUTE (BERII)
BUILDING AND CONSTRUCTION AUTHORITY

Enclosure – Challenge Call Document

BCA–Keppel Land Joint Challenge Call for Test-bedding of Sustainable Solutions

Background

1. Guided by the long-term goal of Positive Energy Low-rise, Zero Energy Medium-rise, Super-low Energy High-rise buildings for the tropics, the Green Buildings Innovation Cluster (GBIC)¹ was set up with funding support from National Research Foundation (NRF).
2. Research, development and demonstration (RD&D) would be playing a more prominent role in Building and Construction Authority (BCA)'s 3rd Green Building Masterplan, to push the envelope and accelerate the adoption of promising building energy-efficient technologies and solutions in the industry.

Challenge Call

3. In this context, BCA and Keppel Land Ltd (KLL) jointly launched an inaugural challenge call inviting companies to submit proposals on sustainable technologies for test-bedding in one of KLL's developments, **Keppel Bay Tower**. This is to provide a platform for large-scale demonstration of emerging technologies in a real world environment that have potential for wider adoption in the market.
4. Under the BCA-KLL Joint Challenge Call for Test-bedding of Sustainable Solutions, successful proposals will be co-funded by KLL and BCA's GBIC funding.
5. The proposal should include emerging technologies that will help to reduce building landlord's energy consumption (e.g. façade, chillers, AHUs, BIPV, energy management systems, etc), as well as solutions that will reduce tenants' energy usage (e.g. lightings, plug loads, etc).

Challenge Statement

¹ GBIC is a one-stop integrated research, development and demonstration (RD&D) hub to experiment, exhibit and exchange knowledge of emerging energy-efficient building solutions with industry stakeholder. It is administered by Building and Construction Authority's Built Environment Research and Innovation Institute - Green Building Research Department.

6. Challenge statement for Keppel Bay Tower is: To achieve an overall energy savings of at least 20% better than the best-in-class Green Mark Platinum buildings².

Challenge Call Objective

7. The Challenge Call aims to link up building owner, technology providers and researchers, to establish a platform where industry / academia can test and showcase these technologies to generate local performance data for verification. In doing so, we hope that these demonstrated technologies, if successful, would be replicated in other buildings and eventually commercialised.

8. Successful applicants will be invited to join Keppel Land, industry partners and/or academia to put up a joint proposal to seek GBIC funding to demonstrate the technologies at Keppel Bay Tower.

9. Demonstrated technologies will be shared with the wider public audience through BCA GBIC web-based portal and publications. In doing so, this would help industry to identify suitable technologies that can be replicated or demonstrated in their building portfolios.

Area of Interests

10. The area of interests is on **novel, cost effective** technologies/solutions that have potential to deliver **high performance in energy efficient, smart and healthy building**, and have potential to **scale up for replication** in the market.

11. Some potential key areas of building technologies and solutions, though not an exhaustive list, are as shown below:

Focus Area	Possible Technologies
Energy Efficiency	Alternative air cool systems (e.g. decoupled sensible and latent cooling; self-adapting distributed cooling system, displacement ventilation system, etc.) and intelligent lighting systems that provide significant energy reduction and yet enhanced occupant thermal comfort and IEQ.
Smart	Adaptive and intelligent technologies / solutions that are responsive to occupant needs, behavior and individual control. Enable occupants to connect to buildings' systems that allow occupants to adjust/ control or monitor building systems and shared facilities. Possible solutions and

² The average EEI for GM Platinum for Existing Buildings is about 149 kWh/m²/yr. The Challenge Call target is to achieve EEI 20% better than the GM Platinum (i.e. **120kWh/m²/yr or better**).

	outcomes - Information Systems (e.g. with machine learning capabilities or integrated sensor technologies) that allow monitoring of energy consumption for data analysis on energy savings, intelligent analytics, fault detection, predictive maintenance, etc.
Building Envelope & Façade System	Novel solutions that can be directly adopted in Singapore's tropical climate which have potential to reduce building heat load. Possible solutions and outcomes - dynamic response façade technologies that are responsive to climatic conditions, daylight façade, energy generation façade system, etc.

12. The technology can arise from proven technology that has not been widely implemented either locally or overseas. All proposals must be a test-bed (i.e., technologies that have yet to be adopted at broad level or commercialised) and completed within 2 years though shorter timeline is preferred. Submissions will be assessed based on their cost effectiveness, innovativeness, and scalability.

Eligibility

13. Both local and foreign enterprises and research institutions, including start-ups and incubators registered with the local authorities in the respective countries are welcome to participate.

14. Proposed solutions shall adhere to the focus areas of this Challenge call. It shall be innovative emerging technologies with potential high impact on energy efficiency of buildings.

15. It should be able to achieve energy savings of at least 20% better than the best in-class technology in the market (best-in-class refers to technology that is commercially available that is pegged to Green Mark Platinum ratings).

Evaluation Criteria

16. The following are criteria which the panel of evaluators will consider in the evaluation of proposal:

a) Technological Novelty

Solutions have to demonstrate innovativeness and effectiveness in energy efficiency, capable of demonstrating how adoption of this solution would push technology and sustainability for tropical urban environment and resulting in at least 20% better than best in class technology.

b) Cost Effectiveness

Solutions shall be cost effective in both capital expenditure as well as operating expenses, preferably with a payback of not more than 4 years.

c) Implementation and Application

Solutions shall be adequately practical and implementable for existing buildings, with relatively easy integration and minimal disruption to the operation and existing tenants.

d) Scalability and Demonstration Effect

Feasibility of scaling up this technology and relevant strategies shall be taken into consideration.

Funding of Proposal

17. Qualifying costs will include:

a) Professional Services:

Design Consultancy, Coordination, Modification, Testing & Commissioning, Certification & Accreditation fees

b) Equipment/ Software/ Materials:

Equipment & materials, Instruments & Consumables, Software, Installation.

c) Researchers / Industry Experts:

Analyse and validate technologies demonstrated.

Rights of Awarding

18. BCA and KLL reserve the right to select proposals to be awarded. For the avoidance of doubt, BCA and KLL reserve the right not to award to any proposal.

Timeline

Stage 1

19. Interested applicants are required to **(i) fill up the Challenge Call application form**, and **(ii) attach the supporting documents** such as technical specification, product brochures, past/on-going project references, etc., and submit via email to BCA_Challenge_Call@bca.gov.sg **by 7 Jul 2017 at 1700 hours** (Singapore time).

20. Shortlisted applicants will be invited to present their proposals to the evaluation panel, tentatively in Jul/Aug 2017.

Stage 2 (For shortlisted proposals in Stage 1):

21. Shortlisted applicants will be notified and invited to join Keppel Land, industry partners and/or academia to put up a joint proposal to seek GBIC funding to demonstrate the technologies at Keppel Bay Tower.

22. Full proposal will be jointly developed and submit by building owner to BCA for funding award.

Contact Person

23. For further enquiries on this challenge call, please contact us at [BCA Challenge Call@bca.gov.sg](mailto:BCA_Challenge_Call@bca.gov.sg).

Enclosed Document

Annex A – Keppel Bay Tower Factsheet

Annex A - Keppel Bay Tower Factsheet



Completed in 2002, Keppel Bay Tower is an eighteen storey commercial building comprising a six storey podium and a basement carpark. Located within the Keppel Bay precinct, the Grade A office tower is a five-minute drive from the Central Business District. It is close to a wide range of dining and entertainment facilities such as VivoCity, St James Power Station and Resorts World Sentosa integrated resort.

The building has a total Gross Floor Area of about 42,000 m² and Net Lettable Area of 36,035 m².

Keppel Bay Tower is certified under BCA Green Mark Platinum for Existing Building category in 2014. Key sustainability elements of the Keppel Bay Tower Building implemented/planned may be summarized below:

High Efficiency Chiller Plant System



The chiller plant is achieving an efficiency of less than 0.60kW/RT.

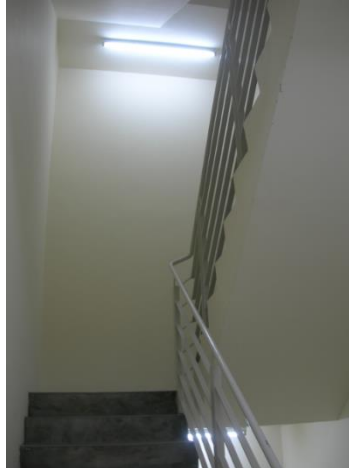
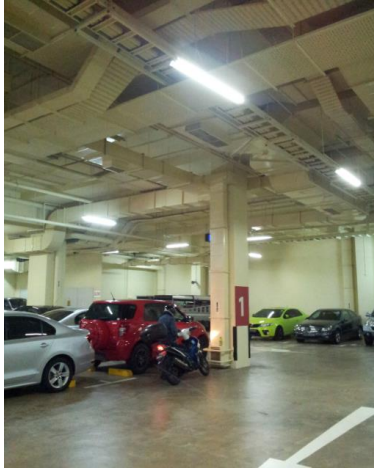
The chiller plant system is equipped with permanent measurement and verification instrumentation for monitoring of the operating system efficiency as well as a heat balancing feature to verify the accuracy of the M&V instrumentation.

Variable Speed Drives

All cooling tower fan motors, water pumps and air handling unit fan motors are equipped with Variable Speed Drives (VSD). The speeds of the VSDs are regulated in accordance with the actual load demand resulting in great saving in energy.



Energy Saving LED lights



LED lightings are installed at the carpark and all staircases within Keppel Bay Tower. LED lights not only consume less electricity, it also generates less heat, lower carbon emissions, extend maintenance cycles and at the same time, enhance the lighting of the carpark and staircases.

Motion Sensors



Motion sensors are installed in toilets and staircases to reduce energy use as well as lengthen the operational life of the light-fittings and bulbs.

High Efficiency Air Filter

All the air handling units are equipped with high efficiency MERV 14 air filters to reduce indoor contaminants, provide good protection for cooling coil and reduce the frequency of duct cleaning.



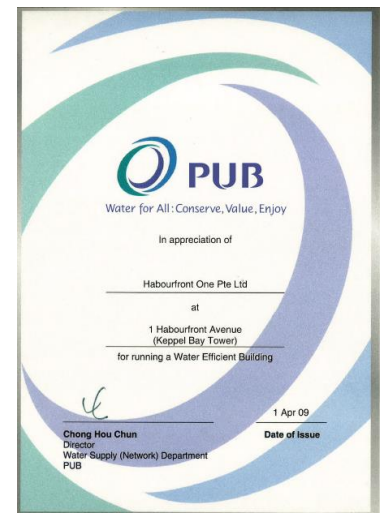
Auto Tube Cleaning System for Chillers



All the new chillers in Keppel Bay Tower will be equipped with auto tube cleaning system which is effective in maintaining the cleanliness and the efficiency of the chiller condenser heat exchanger.

Water Efficient Fittings

To conserve water, water-efficient fittings were installed, as approved under the PUB Water Efficiency Labelling Scheme. Keppel Bay Tower is a PUB Water-Efficient Building since April 2009.



Recycle of used light fittings



As part of the building management's effort towards creating a sustainable environment, Keppel Bay Tower recycles all used light fittings. This includes the specialised recycling of mercury which is a toxic metal in fluorescent lamps, to prevent the emission of the hazardous waste into the environment.

PROJECT FACTSHEET

Building Information

Gross Floor Area (m ²)	41,840	Carpark Area (m ²)	7,265
Air-conditioned areas (m ²)	38,444	Site Area (m ²)	7,302
Non- air-conditioned areas excluding transit/circulation, M&E plant room and common areas (m ²)			NIL

Air-Conditioning System Information

A/C system efficiency (kW/RT)	0.60
Chiller efficiency (kW/RT)	0.498
Chiller configuration (e.g. 2 x 500 RT)	2 x 560RT
Total cooling load (RT)	880
Air-conditioned areas (m2)	38,444
Cooling load / area (W/m ²)	80.51
Main type of A/C system	<input checked="" type="checkbox"/> Water-Cooled Chiller

Energy Efficiency : Central Water-cooled Air-conditioning System

☒ Central Chiller Plant System

Chiller plant component efficiency	Aircon Plant (kW/RT)
Chiller	0.498
Chilled water pump	0.031
Condenser water pump	0.041
Cooling tower	0.030
Total system efficiency	0.600

☒ Variable Speed Drives for chiller water pumps

☒ Variable Speed Drives for condenser water pumps

☒ Variable Speed Drives for cooling towers

Energy Efficiency : Air Distribution System

☒ Variable Air Volume System (Efficiency = 0.441 (W/CMH))

☒ Constant Air Volume System (Efficiency = 0.334 (W/CMH))

Energy Efficiency : Lighting System

☐ T5 fluorescent lighting

☒ T8 fluorescent lighting

☒ LED Lamps

☐ Daylighting design

☐ Motion detector to optimize lighting usage

☐ Photo sensors to harness daylight for use

Energy Efficiency : Vertical Transportation System

☒ Energy efficient lifts with VVVF & sleep mode

☒ Escalators with motion detector

☐ Regenerative motors

Renewable Energy

☐ Solar panels to harness solar energy (In terms of peak kW): _____

☐ Wind turbines

☐ Solar water heating panel

☐ Sun pipes

☐ Light shelves

☒ Motion sensors for toilets and/or staircases

☐ Photo sensors to maximize use of daylighting

Energy - Other features

☒ Variable speed drives for Air Handling Units

☒ CO₂ sensors to regulate fresh air

☒ CO sensor for basement carpark ventilation

☐ Heat recovery devices

Sustainable Operation & Maintenance

Environmental Protection

☒ Refrigerants with ODP = 0 or GWP<100 (Pls specify refrigerant: R134a)

☒ Refrigerant leak detection system

Indoor Environment Quality

- ☒ Provision of high efficiency air filter in AHU
- ☒ Room temperature display
- ☒ Carbon dioxide display
- ☒ Low VOC paints to reduce indoor air pollutants
- ☒ High frequency ballast to reduce flickering of lights

Other Green Features & Innovations

- ☐ Carpark Guidance System
- ☐ Heat Recovery Systems
- ☐ Tri-generation or Co-generation plant
- ☐ Vertical Greening
- ☒ Ultraviolet light in AHU to improve indoor air quality

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