GREEN BUILDINGS INNOVATION CLUSTER (GBIC) 2.0 THEMATIC CHALLENGE CALL FOR HIGH-RISE COMMERCIAL OFFICE & HOTEL BUILDINGS

Introduction

1. The Green Buildings Innovation Cluster (GBIC) Programme (Green Buildings Innovation Cluster (GBIC) Programme | Building and Construction Authority (BCA)), is an integrated research, development and demonstration (RD&D) hub set up under the National Research Foundation (NRF)'s Urban Solutions and Sustainability (USS) domain. To further push the boundaries of energy efficiency in buildings, NRF has in 2022 allocated an additional $45 million to BCA to enhance the GBIC programme (GBIC 2.0) in 2022 to support the research, prototyping and demonstration of green building technologies.

Objective

2. Under the Singapore Green Building Masterplan, BCA will work with stakeholders to deliver three outcomes; (a) 80% of our building GFA by 2030, (b) 80% of new developments to be SLE from 2030 onwards and (c) for best-in-class buildings to achieve 80% energy efficiency improvement from 2005 levels by 2030, which will require building owners and their project teams to look at innovations and various ways to push the boundaries and improve their buildings' energy efficiency.

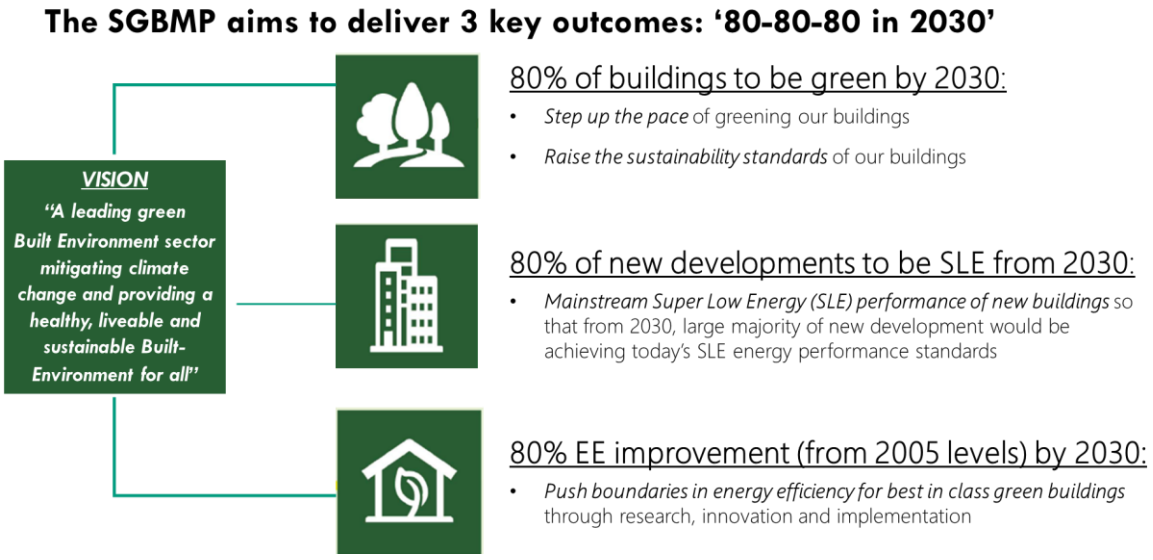

Figure 1: SGBMP 80-80-80 Targets

Scope of Challenge Call

3. This Challenge Call will focus on **high-rise commercial office and hotel buildings**, with the aim to address their challenge statements and co-create solutions to push the boundaries and improve energy efficiency.

Typical Sustainability Challenges in High-Rise Commercial Office Buildings

4. As office buildings account for approximately 35% of building sector's electricity consumption and cooling accounts for around 40%- 60% of energy used, it is important to look at ways to improve the energy efficiency of the air-conditioning system and to innovate the way we cool our buildings.

5. With greater emphasis on occupant's health, well-being and productivity, raising fresh air intake has been widely accepted as an effective means to improve indoor environment. In addition, recent shifts in weather patterns have resulted in rising ambient temperatures and more frequent hot spell, and hence more energy will be required to treat the outdoor air.

6. On the other hand, latest advancements in artificial intelligence, growing call for automation, and Internet Of Things (IoT) based smart solutions present opportunities to achieve further energy savings through smart integration of building management systems using data to further optimize the building performance.

Typical Sustainability Challenges in Hotels

7. In the case of Hotels, there were difficulties in adopting typical energy-saving strategies due to the nature of its business where the focus is on guest satisfaction and therefore a more innovative and smart solutions are required.

8. One of the challenges of existing hotels is the lack of energy consumption information on their sub-systems resulting in difficulties to identify problematic areas of high energy use or energy waste.

9. With the increasing emphasis of ventilation in the post-pandemic era which could lead to higher fresh air intake, there would be a need to develop innovative solutions to balance the various building requirements while ensuring that the sustainability agenda and energy efficiency are not compromised.

Collaborations with key industry stakeholders

10. BCA had sought interest from key developers, building owners and building operators (known as Challenge Statement Owners) to identify building projects facing challenges and to tap on this Challenge Call to solicit innovative technologies and solutions as outlined in our Super Low Energy Building (SLEB) Technology Roadmap (Figure 2) to address these challenges.

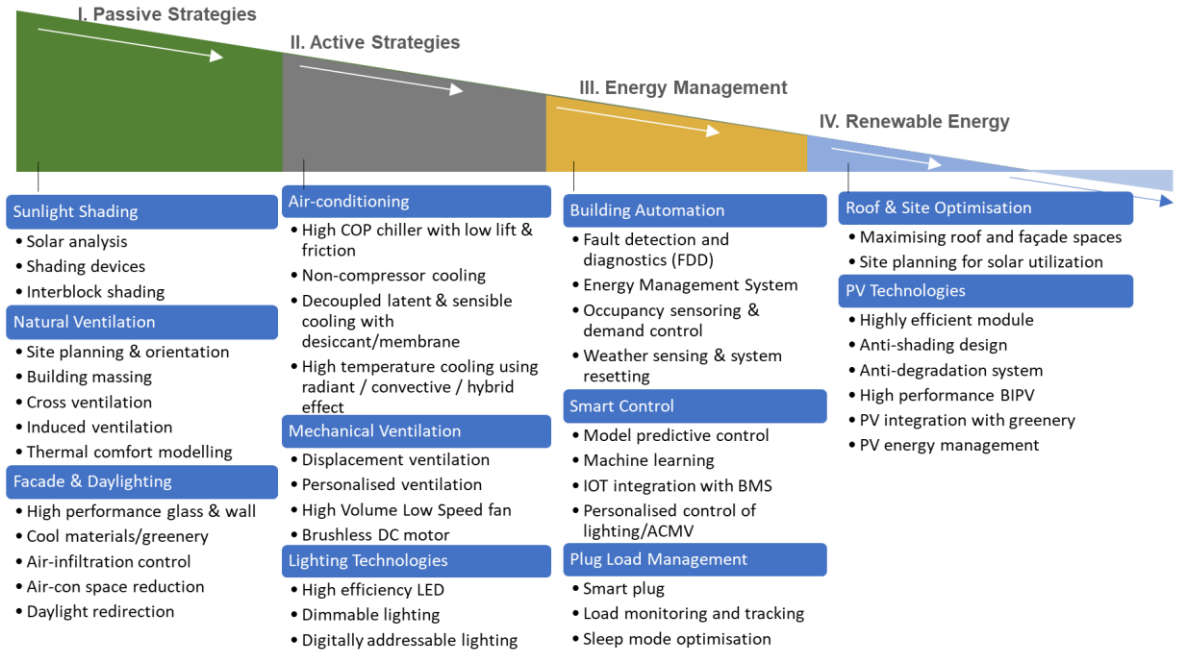

Figure 2: SLEB Technology Roadmap

11. This call aims to reach out to local and global technology firms, environmental sustainability design (ESD) consultants and local research institutes with the relevant technology or innovative solutions to address the following challenge statements from the Challenge Statement Owners in **Annex A**.

12. Participants must be driven to develop and test their solutions along with the Challenge Statement Owners in Singapore during and after the challenge, and / or partner with a local industry player.

Scope of Challenge Call

13. This Thematic Challenge Call will adopt a 3-prong approach to cater to different needs of building owners/developers focusing on Demonstration and Research & Innovation (R&I) which covers Research and Development (R&D) and Product Prototyping.

(A) Demonstration

Intent	To support shortlisted building to demonstrate innovative energy efficient technologies and solutions to achieve best-in-class building energy efficiency.
Target Group	Consortium led by a consultant/system integrator, in partnership with progressive technology firms and leading research performers
Technology Readiness Level [1]	Start TRL: 7; End TRL: 9

[1] Please refer to Annex D2 for TRL descriptions

Desired Outcome	75% building energy efficiency Improvement from 2005 levels.

Eligibility

14. This call is open to all private technology solution providers and public research entities. **Industry driven proposals will be assessed more favourably.** Institutes of Higher Learning (IHLs), research start-ups, and not-for-profit organisations, are strongly encouraged to co-create innovative solutions with the industry.

Evaluation Criteria

15. The following criteria will be used for the evaluation of proposals:

a) Energy Efficiency

- Proposals submitted must meet the targets set by the respective building owners in their challenge calls. This must be supported by an energy modelling with all the proposed technologies and solutions included

b) Scalability

- Ability to ramp up production of technologies and provide after-sale supports with partners.
- Potential application of technologies across wider building typologies

c) Commercial viability and cost

- Solutions developed are cost effective such as reasonable payback period, , and lower operating cost such as reducing the frequency of maintenance and replacement of parts.
- Potential for commercialisation, which includes technology transfer to industry, partnerships with established organizations with global outreach.

d) Novelty and innovation

- Aligned with SLEB Technology Roadmap focus areas
- Improve current practices or setting new standards for industry
- Involvement of research performers

Funding Support

16. Upon shortlisting of the proposal, the building owner/operator will submit the GBIC-Demonstration application for funding support to demonstrate the technologies and solutions for the proposed building project.

(B) Product Prototyping

	Product Prototyping
Intent	Refinement of existing innovation to be ready for market adoption upon completion.
Target Group	Solution provider from private sector as lead with research institute as collaborator, building owner/developer as sponsor/adopter.
Technology Readiness Level	Start TRL: 5; End TRL: 7
Desired Outcome	Technologies achieve at least 25% better than current GM 2021 Platinum standards[2] (See Annex D1: GM 2021 Platinum Standards) or existing best-in-class solutions, whichever is better.

Eligibility

17. This call is open to all private technology solution providers and public research entities. Project will be led by industry with Institutes of Higher Learning (IHLs), research start-ups, to co-create innovative solutions with the industry.

Evaluation Criteria

18. The following criteria will be used for the evaluation of proposals:

a) Energy Efficiency

- Proposals submitted must meet the targets set by the respective building owners in their challenge call and achieve at least 25% better GM 2021 Platinum standards or current best-in-class technologies, whichever is better.

b) Scalability

- Ability to ramp up production of technologies and provide after-sale support with partners.
- Potential application of technologies across wider building typologies

c) Commercial viability and cost

- Solutions developed are cost effective such as reasonable payback period and lower operating cost such as reducing the frequency of maintenance and replacement of parts.
- Potential for commercialisation, which includes technology transfer to industry, partnerships with established organizations with global outreach.

d) Novelty and innovation

[2] Please refer to the GM 2021 Platinum EE standards: https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/20211027_energy_simplified_ver1.pdf

- Aligned with SLEB Technology Roadmap focus areas
- Improve current practices or setting standards for industry
- Involve research performers in development and verification

Funding Support

19. Private sector entities will qualify for up to 70%[3] funding support of approved direct qualifying costs of a project. Singapore-based IHLs and public sector agencies will qualify for up to 100% funding support of approved direct qualifying costs of a project. Only Singapore-based IHLs would be allowed support for indirect costs. These include up to 20% of qualifying costs for overhead costs. Total project cost capped at $0.5M**.**

20. Proposals should not be funded or be currently considered for funding by other agencies. Funding awarded cannot be used to support overseas R&D activities. All funding awarded must be used to carry out the demonstration activities in Singapore unless approved in the grant.

(C) R&D

	R&D
Intent	Develop innovative technology to address mid to longer term solution.
Target Group	Solution provider from private sector or research institute as lead with building owner/developer as sponsor/adopter.
Technology Readiness Level	Start TRL: 3; End TRL: 6
Desired Outcome	Technologies achieve at least 30% better than current GM 2021 Platinum standards (See Annex D1: GM 2021 Platinum Standards) or existing best-in-class solutions, whichever is better.

Eligibility

21. This call is open to all public and private entities. I**ndustry driven proposals will be assessed more favourably.** Institutes of Higher Learning (IHLs), research start-ups, and not-for-profit organisations, are strongly encouraged to co-create innovative solutions with the industry.

Evaluation Criteria

[3] Depends on the type of firms, the cap could range from 30 – 70%. For more info, please refer the FAQ or BCA wedsite:https://www1.bca.gov.sg/buildsg/buildsg-transformation-fund/green-buildings-innovation-cluster-gbic-programmehttps://www1.bca.gov.sg/buildsg/buildsg-transformation-fund/green-buildings-innovation-cluster-gbic-programme

22. The following criteria will be used for the evaluation of proposals:

a) Energy Efficiency

- Proposals submitted must meet the targets set by the respective building owners in their challenge calls and achieve at least 30% better than GM 2021 Platinum standards or current best-in-class technologies, whichever is better.

b) Scalability

- Ability to ramp up production of technologies and provide after-sale supports with partners.
- Potential application of technologies across wider building typologies

c) Commercial viability and cost

- Potential for commercialisation, which includes licensing of technology, technology transfer to industry,
- Solutions developed are cost effective such as reasonable payback period and lower operating cost such as reducing the frequency of maintenance and replacement of parts.

d) Novelty and innovation

- Game-changing, disruptive technology, not used in Singapore before.
- Aligned with SLEB Technology Roadmap focus areas
- Improve current practices or setting standards for industry
- Involve research performers in development and verification

Funding Support

23. Singapore-based IHLs and public sector agencies will qualify for up to 100% funding support of approved direct qualifying costs of a project. Only Singapore-based IHLs would be allowed support for indirect costs. These include up to 20% of qualifying costs for overhead costs. Private sector entities will qualify for up to 70% funding support for approved direct qualifying costs of a project. Total project cost capped at $1M. Funding for private sector entities for R&D projects with total project budget more than $0.5M would be conditional on collaboration with a local public research performer.

24. Proposals should not be funded or be currently considered for funding by other agencies. Funding awarded cannot be used to support overseas R&D activities. All funding awarded must be used to carry out the demonstration activities in Singapore unless approved in the grant.

Application and Evaluation Process

25. Participants can submit for both Demonstration, R&I (i.e. R&D or Product Prototyping) or both challenge calls.

<u>For Demonstration Challenge Call Submission:</u>

26. We require interested parties to form a consortium led by the consultant and/or system integrator. The team would comprise of ESD consultants, technology firms and research performers. You are required to work out the partnership model amongst yourselves.

27. **You are encouraged to approach the building owners issuing the challenge statements to better understand their challenges when preparing for the proposals.** Please refer to Annex A for the building owners' contact details.

28. You are required to submit your proposal via email: BCA_Challenge_Call@bca.gov.sg using the Demo Application template provided in Annex C by **29 May 2023, 2359 hours** (Singapore time).

29. Successful shortlisted proposals will be informed and will work with the building owner to jointly prepare and submit the GBIC-Demonstration application for funding support.

For R&I (R&D or Product Prototyping) Call Submission:

30. The Lead Principal Investigator (PI) from private sector or research institute shall submit the endorsed proposals through the Integrated Grant Management System (IGMS) at https://researchgrant.gov.sg/ with the supporting documents by **28 Apr 2023, 2359 hours** (Singapore time).

31. Please download the Integrated Grant Management System (IGMS) User Guide from the IGMS system at https://researchgrant.gov.sg/ for all instructions and guidelines on the submission process and information relating to the Grant Call.

32. Lead PI and Co-PIs from organisations that are not registered in the IGMS are advised to contact BCA_Challenge_Call@bca.gov.sg to assist with the registration for an IGMS account. Applicants are advised to allow sufficient time (at least 2 weeks) for their respective organisation to be registered, including registering their respective researcher profiles in the IGMS prior to submitting proposals. Refer to Annex B for further information.

33. **You are encouraged to approach the building owners issuing the challenge statements to better understand their challenges when preparing for the proposals.** Please refer to Annex A for the building owners' contact details.

34. For enquiries on the Challenge Call, please email BCA_Challenge_Call@bca.gov.sg. For other enquiries pertaining to IGMS system, please email IGMS helpdesk at Helpdesk@researchgrant.gov.sg.

35. Shortlisted applicants may be invited to present their proposals to the Project Evaluation Panel (PEP). Successful shortlisted project teams will be invited to proceed to develop Full Proposal. This will be followed by the final selection of proposals for award.

Briefing to Interested Parties

36. **There will be a post-launch virtual briefing to interested parties on 9 Mar 2023 (Thursday), 2-5pm. Please register your attendance by 7 Mar 2023 via the link: https://form.gov.sg/63f4369a3812400012ed2570**

Indicative Timeline

37. Indicative timeline is as below:

Activities	**Indicative Timeline**
Launch of Challenge Call	28 Feb 2023
Briefing to interested parties	9 Mar 2023
Proposal preparation & consultation between innovators & challenge statement owners	Mar – Apr/May 23
Close of Challenge Call	28 Apr 23 (R&I) 29 May 23 (Demo)
Notification of shortlisted proposals to proceed with final proposal submission	Jun 23 (R&I) Jul 23 (Demo)
Project Evaluation Review	Jul 23 (R&I) Sep 23 (Demo)
Notification of award of proposals	Aug 23 (R&I) Oct 23 (Demo)

Rights of Awarding

36. BCA reserves the right to select proposals to be awarded. For the avoidance of doubt, BCA reserves the right not to award any proposal.

Enclosed Annexes:

Frequently Asked Questions (FAQs) for Challenge Call

Annex A: Challenge Statements and Building Information Details

Annex B: SOP for Creation of New Companies/Institutions in IGMS

Annex C: Demonstration Application Form

Annex D: Other Useful Information