Green Buildings Innovation Cluster 2.0
2nd Thematic Challenge Call Briefing

Noel Chin
Green Buildings Policy and Technology Department,
Building and Construction Authority,
7 July 2025, 1400-1600hrs
Via MS Teams

Agenda

	Topic	Presenter
14:00 – 14:05	Opening remark by BCA	D/GBPTD Dr Edward Ang
14:05 – 14:20	Overview of the Challenge Call – Demonstration Scheme	PM/GBPTD Mr Noel Chin
14:20 – 14:40	Overview of the Challenge Call – R&I Scheme	
14:40 – 15:30	Q&A Session	
15:30	End of Briefing	

Singapore Green Building Masterplan: Build our green future together

The SGBMP aims to deliver 3 key outcomes: '80-80-80 in 2030'

VISION

"A leading green Built Environment sector mitigating climate change and providing a healthy, liveable and sustainable Built-Environment for all"

80% of buildings to be green by 2030:

- ***Step up the pace*** of greening our buildings
- ***Raise the sustainability standards*** of our buildings

80% of new developments to be SLE from 2030:

- ***Mainstream Super Low Energy (SLE) performance of new buildings*** so that from 2030, large majority of new development would be achieving today's SLE energy performance standards

Solutions are technologically feasible and economically viable

80% EE improvement (from 2005 levels) by 2030:

- ***Push boundaries in energy efficiency for best-in-class green buildings*** through research, innovation and implementation

Super Low Energy Building Technology Roadmap

I. Passive Strategies

II. Active Strategies

III. Energy Management

IV. Renewable Energy

Sunlight Shading

- Solar analysis
- Shading devices
- Interblock shading

Natural Ventilation

- Site planning & orientation
- Building massing
- Cross ventilation
- Induced ventilation
- Thermal comfort modelling

Facade & Daylighting

- High performance glass & wall
- Cool materials/greenery
- Air-infiltration control
- Air-con space reduction
- Daylight redirection

Air-conditioning

- High COP chiller with low lift & friction
- Non-compressor cooling
- Decoupled latent & sensible cooling with desiccant/membrane
- High temperature cooling using radiant / convective / hybrid effect

Mechanical Ventilation

- Displacement ventilation
- Personalised ventilation
- High Volume Low Speed fan
- Brushless DC motor

Lighting Technologies

- High efficiency LED
- Dimmable lighting
- Digitally addressable lighting

Building Automation

- Fault detection and diagnostics (FDD)
- Energy Management System
- Occupancy sensoring & demand control
- Weather sensing & system resetting

Smart Control

- Model predictive control
- Machine learning
- IOT integration with BMS
- Personalised control of lighting/ACMV

Plug Load Management

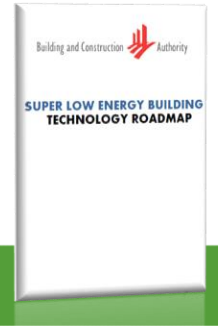
- Smart plug
- Load monitoring and tracking
- Sleep mode optimisation

Roof & Site Optimisation

- Maximising roof and façade spaces
- Site planning for solar utilization

PV Technologies

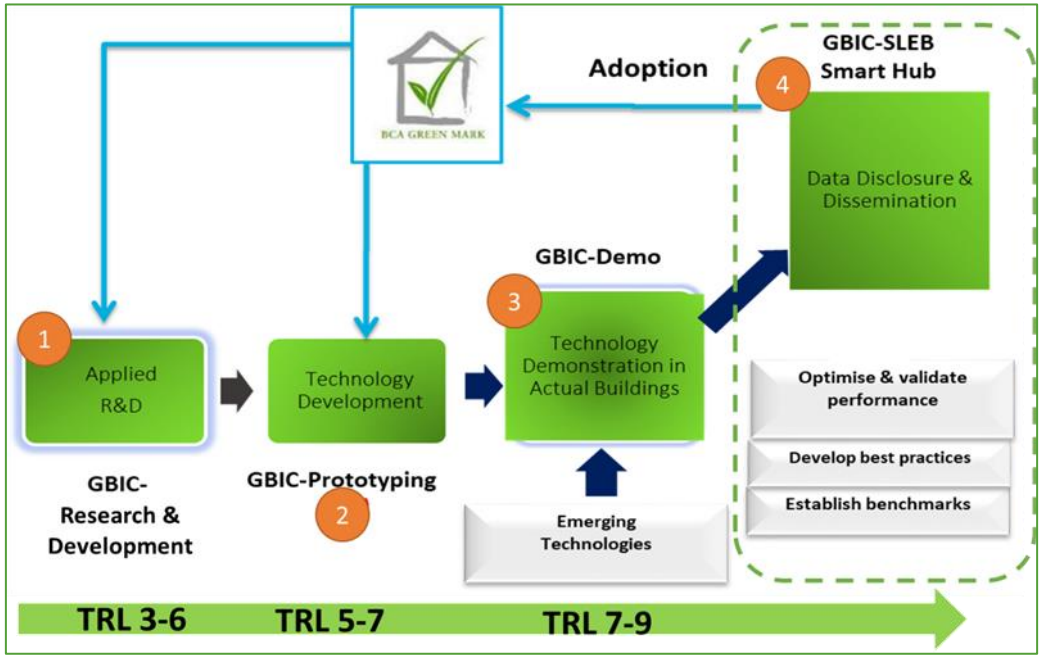
- Highly efficient module
- Anti-shading design
- Anti-degradation system
- High performance BIPV
- PV integration with greenery
- PV energy management



Find out more here!

Green Buildings Innovation Cluster (GBIC) Programme

One-stop research, development and demonstration platform for technologies and innovations that lead to highly energy efficient buildings



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Innovative Technologies

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Supported Firms

Find out more here!

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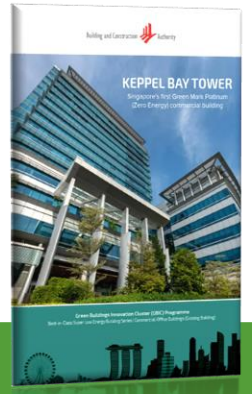

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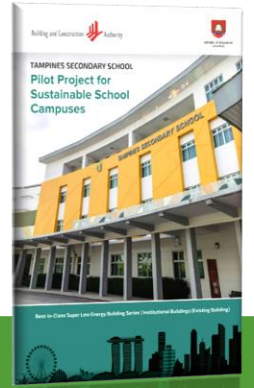
Keppel bay Tower



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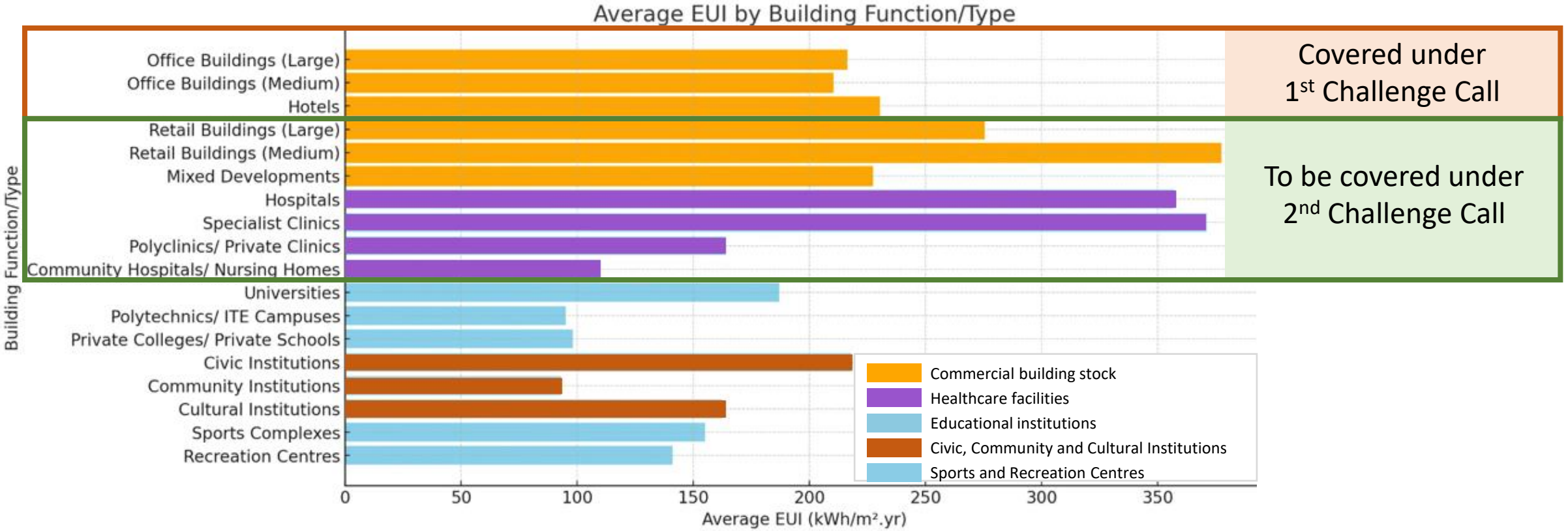
Tampines Secondary School

2nd Thematic Challenge Call
Healthcare, Retail, Mixed Development and Hotel Buildings



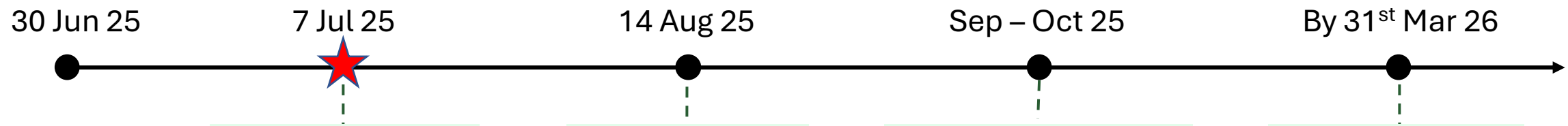
Energy consumption by building type in 2022 (source: BCA BEBR 2023 Report)

Target:

- Buildings to achieve better than 75% energy efficiency improvement from 2005 baseline Energy Use Intensity (EUI).
- Develop innovative solution with 25 – 30% energy efficiency improvement over GM 2021 Platinum standards or current best-in-class technologies, whichever is better.

Application and Evaluation Process for Challenge Call

Key Timeline



Launch of Challenge Call

Briefing on Challenge Call

[R&I Scheme]
New applicants to apply for IGMS account

Close of Challenge Call

[R&I Scheme]
Proposals are to be submitted via IGMS

[Demo Scheme]
Proposals are to be emailed to BCA_Challenge_Call@bca.gov.sg

Shortlisted applicants will be notified and will be required to present to Project Evaluation Panel for evaluation.

Notification on award of proposal

Data Management

Applies to all scheme

NEW

To safeguard against data leaks/breaches, depending on the nature of the Research, the Host Institution, Partner Institutions and/or Collaborators may be required by BCA to

a) Attain one of the data and/or cybersecurity standards certifications as a pre-requisite to start the project, receive data requested or execute the data collection (e.g. survey) for the Research.

- Cyber Security Agency (CSA) Cybersecurity Standards
- Infocomm Media Development Authority (IMDA) Data Security Standards
- Cyber Essentials Mark (CEM)
- Data Protection Essentials (DPE)

b) Conduct an independent exit external audit assessment upon completion or termination of the Research

Exact requirements will be determined after evaluation and BCA will officially inform the applicants selected for award in writing. Failure to obtain the required certifications may affect project progress leading to delays in payment milestones, and potentially termination of the award.

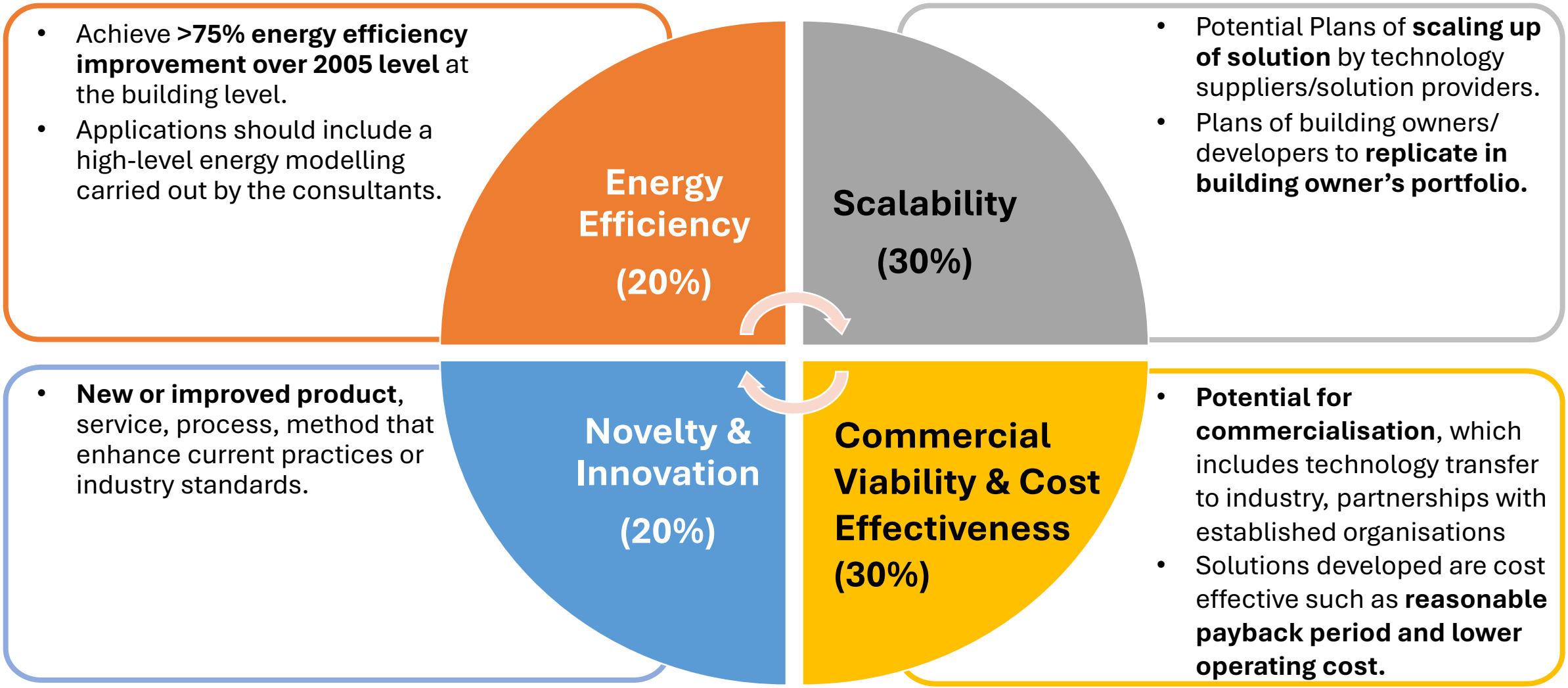
GBIC Demonstration Scheme

GBIC Demonstration Scheme

Intent	To encourage building owners/developers to demonstrate innovative energy efficient technologies and solutions to achieve best-in-class building energy efficiency improvement for **healthcare, retail, mixed development and hotel buildings**
Target Group	**Building owners/developers.** Submit GBIC-Demo application with **proposals from consortiums led by ESD Consultants together with technology and solution providers.**
Technology Readiness Level	Start TRL: 7 End TRL: 9
Funding	Up to 70% depending on the profile of the entities, capped at $3m.

Desired Outcomes	<u>1) Energy Efficiency Improvement</u>
	• **75%** building energy efficiency improvement from 2005 levels - Target Energy Use Index (EUI) kWh/m^2/year:
	  • Healthcare:
	  • Hospitals: Baseline: 750; Target: 187.5
	  • Polyclinics: Baseline: 300; Target: 75
	  • Community Hospitals: Baseline: 462.5; Target: 115.6
	  • Nursing Homes: Baseline: 175; Target: 43.7
	  • Retail Buildings: Baseline 480; Target:120
	  • Mixed Development: Based on pro-rated GFA.
	  • Hotel: Baseline 476 ; Target: 119
	
	<u>2) Solutions</u>
	• Open to local and overseas technology companies with the following criteria:
	  • Solutions must be *technically feasible* and *commercially viable,*
	  • Ready to scale up for *mass market adoption*

Evaluation criteria



- Achieve **>75% energy efficiency improvement over 2005 level** at the building level.
- Applications should include a high-level energy modelling carried out by the consultants.

- Potential Plans of **scaling up of solution** by technology suppliers/solution providers.
- Plans of building owners/ developers to **replicate in building owner's portfolio.**

- **New or improved product**, service, process, method that enhance current practices or industry standards.

- **Potential for commercialisation**, which includes technology transfer to industry, partnerships with established organisations
- Solutions developed are cost effective such as **reasonable payback period and lower operating cost.**

Submission Timeline

Submission:

Applicants can download the required documents from the SLEB Smart Hub.

Please submit completed proposal via email to BCA_Challenge_Call@bca.gov.sg by **14 Aug 2025, 5:00 PM** (Singapore time).

For more information on the Challenge Call, please visit https://www1.bca.gov.sg/buildsg/buildsg-transformation-fund/green-buildings-innovation-cluster-gbic-programme

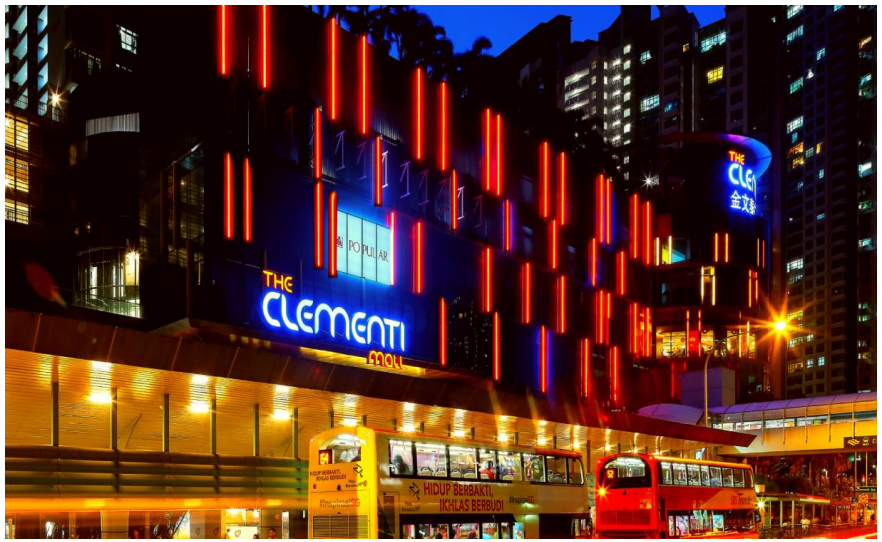
Any question, please write to BCA_Challenge_Call@bca.gov.sg.

Building 1: Raffles Hospital & Raffles Specialist Centre

Building Typology	Hospital & Specialist Centre
Number of Floors	13-storey Hospital & 23-storey Specialist Centre
Gross Floor Area (sqm)	49,272
Current Annual Energy Consumption (kWh/year)	15,059,433
Current Energy Use Index (kWh/m^2/year)	306
Current Green Mark Certification	No
Demonstration Area	Entire building
Contact Person's Details	Heng Wee Khim Weekhim_heng@rafflesmedical.com

Building 2: The Clementi Mall

Building Typology	Retail
Number of Floors	6-storey building
Gross Floor Area (sqm)	26,973.71
Current Annual Energy Consumption (kWh/year)	16,259,943
Current Energy Use Index (kWh/m^2/year)	602.81
Current Green Mark Certification	Gold
Demonstration Area	Entire building
Contact Person's Details	Cristal Fm_Tcm_Trm@straitsproperties.com.sg Fm_grp@straitsproperties.com.sg



Building 3: Century Square

NEW

Building Typology	Retail
Number of Floors	5-storey and 3 levels of basement
Gross Floor Area (sqm)	30,400
Current Annual Energy Consumption (kWh/year)	14,774,400
Current Energy Use Index (kWh/m^2/year)	486
Current Green Mark Certification	Platinum (GM 2021: In operation)
Demonstration Area	Entire building
Contact Person's Details	Lewis Chua Lewis.chua@fraserspropery.com

Building 4: Causeway Point

NEW

Building Typology	Retail
Number of Floors	7-storey and 3 levels of basement
Gross Floor Area (sqm)	38,998
Current Annual Energy Consumption (kWh/year)	18,212,066
Current Energy Use Index (kWh/m^2/year)	467
Current Green Mark Certification	Gold (GM 2021: In operation)
Demonstration Area	Entire building
Contact Person's Details	Lewis Chua Lewis.chua@frasersproperty.com

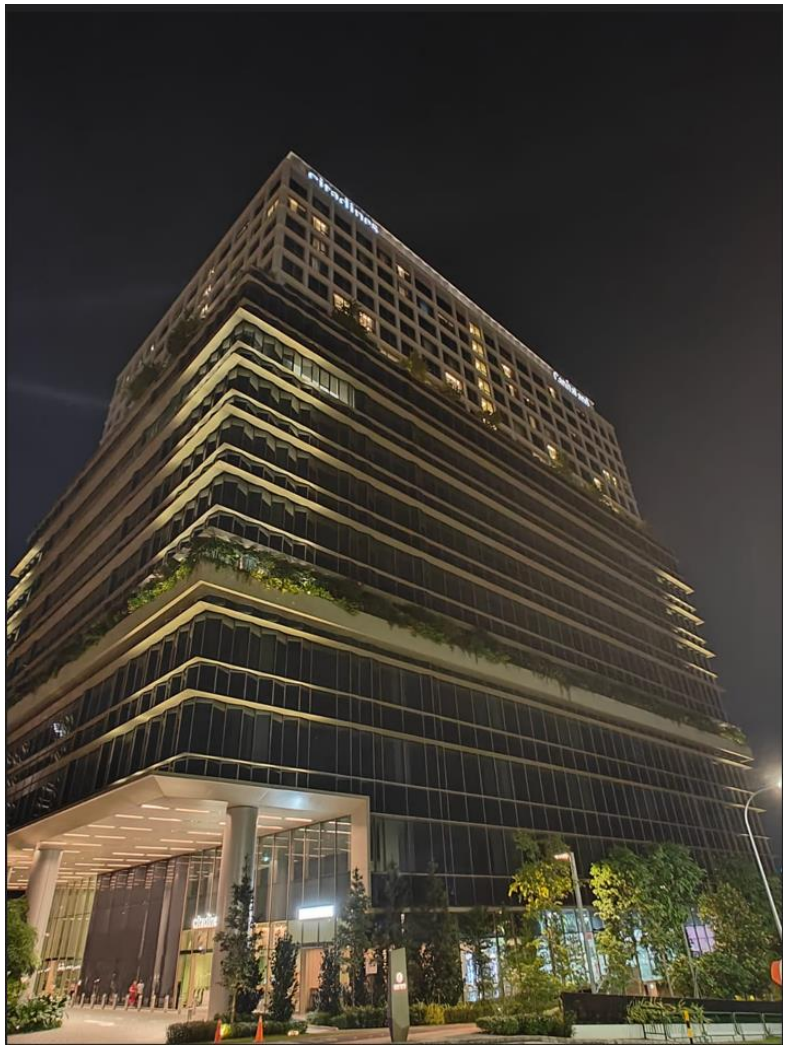
Building 5: Northpoint City (North Wing)

NEW

Building Typology	Retail
Number of Floors	4-storey and 3 levels of basement
Gross Floor Area (sqm)	34,985
Current Annual Energy Consumption (kWh/year)	20,256,315
Current Energy Use Index (kWh/m^2/year)	579
Current Green Mark Certification	Gold (GM 2021: In operation)
Demonstration Area	Entire building
Contact Person's Details	Lewis Chua Lewis.chua@fraserspropery.com

Building 6: 7 Science Park (GENEO)

Building Typology	Mixed Development
Number of Floors	1 Block of 15-storey business park and hotel with 2 levels of basement carparks
Gross Floor Area (sqm)	38,818.36
Current Annual Energy Consumption (kWh/year)	2,058,906
Current Energy Use Index (kWh/m^2/year)	53.04
Current Green Mark Certification	Platinum SLE
Demonstration Area	Entire building
Contact Person's Details	Derrick Lim: derrick.lim@capitaland.com Lim Wee Boon: lim.weeboon@capitaland.com Lee Shun Hao: lee.shunhao@capitaland.com



Building 7: Paragon

Building Typology	Mixed Development
Number of Floors	6-storey retail podium, 1 level of basement with 14-storey tower and another 3-storey tower on top of retail podium
Gross Floor Area (sqm)	94,393
Current Annual Energy Consumption (kWh/year)	34,338,710
Current Energy Use Index (kWh/m^2/year)	363.78
Current Green Mark Certification	Gold
Demonstration Area	Entire building
Contact Person's Details	Cristal Fm_Tcm_Trm@straitsproperties.com.sg Fm_grp@straitsproperties.com.sg

Building 8: Grantral Mall Macpherson

Building Typology	Mixed Development
Number of Floors	8-storey
Gross Floor Area (sqm)	45,441.46
Current Annual Energy Consumption (kWh/year)	11,000,000
Current Energy Use Index (kWh/m^2/year)	To be confirmed
Current Green Mark Certification	No
Demonstration Area	Entire building
Contact Person's Details	David Cheong David.cheong@theelegantgroup.com

Building 9: Tiong Bahru Plaza/ Central Plaza

NEW

Building Typology	Mixed Development
Number of Floors	4-storey retail, 20-storey office, 3 levels of basement
Gross Floor Area (sqm)	48,235
Current Annual Energy Consumption (kWh/year)	17,654,010
Current Energy Use Index (kWh/m^2/year)	366
Current Green Mark Certification	GoldPlus (GM 2021: In operation)
Demonstration Area	Entire building
Contact Person's Details	Lewis Chua Lewis.chua@frasersproperty.com

Building 10: Frasers Tower

NEW

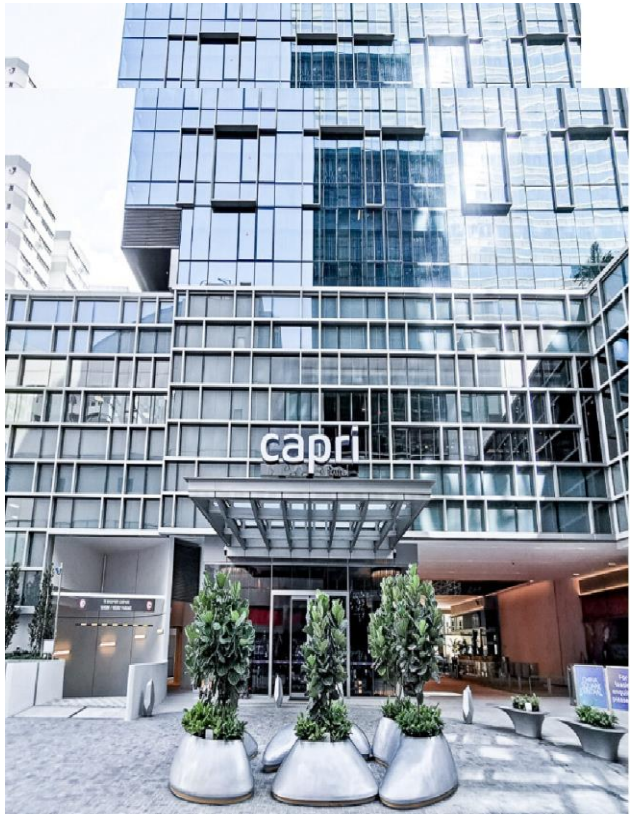
Building Typology	Mixed Development
Number of Floors	3-storey retail podium, 39-storey office, 3 levels of basement
Gross Floor Area (sqm)	77,163
Current Annual Energy Consumption (kWh/year)	13,272,036
Current Energy Use Index (kWh/m^2/year)	172
Current Green Mark Certification	Platinum (GM NRB 4.1)
Demonstration Area	Entire building
Contact Person's Details	Lewis Chua Lewis.chua@fraserspropery.com

Building 11: SingHealth Tower/ Outram Community Hospital

Building Typology	Mixed Development
Number of Floors	21-storey above ground, 4 levels of basement
Gross Floor Area (sqm)	149,000
Current Annual Energy Consumption (kWh/year)	35,968,159
Current Energy Use Index (kWh/m^2/year)	241.4
Current Green Mark Certification	Platinum
Demonstration Area	Dedicated area (service lobby)
Contact Person's Details	Foo Seck Sen: foo.seck.sen@singhealth.com.sg Lim Kian Giap: lim.kian.giap@singhealth.com.sg Ryan Thio: ryan.thio.t.j@singhealth.com.sg

Building 12: Capri by Frasers, China Square

Building Typology	Hotel
Number of Floors	16-storey
Gross Floor Area (sqm)	15,354
Current Annual Energy Consumption (kWh/year)	2,639,400
Current Energy Use Index (kWh/m^2/year)	172
Current Green Mark Certification	GoldPlus SLE
Demonstration Area	Entire building
Contact Person's Details	Alex Chua Alex.chua@fraserspropery.com



GBIC Research & Innovation (R&I) Scheme

R&I Schemes

This Research & Innovation (R&I) Challenge Call covers two schemes and focuses on **Healthcare buildings**:

	R&D	Product Prototyping
Intent	Support **development of high impact solution** to be ready for piloting upon completion.	Support **refinement of innovation** to be ready for piloting upon completion.
Target Group	Solution provider from private sector[1] or research institute as lead with building owner/developer as sponsor/adopter.	Solution provider from private sector[2] as lead with research institute as collaborator, building owner/developer as sponsor/adopter.
Technology Readiness Level	Start TRL: 3 End TRL: 7-8	Start TRL: 5 End TRL: 8
Funding	Up to 70% for private sector[1], 100% for IHL/RI Funding size to be reviewed case-by-case basis.	Up to 70% for private sector[2], 100% for IHL/RI Cap at S$500,000 per project.
Project Duration	Up to **two years**	Up to **one year**
Desired Outcomes	• Technologies achieve at least 30% better than current GM 2021 Platinum standards or existing best-in-class solutions, whichever is better. • Commercially viable solutions with good ROI (i.e. potential payback of 3 – 5 years)	• Technologies achieve at least 25% better than current GM 2021 Platinum standards or existing best-in-class solutions, whichever is better. • Commercially viable solutions with good ROI (i.e. potential payback of 3 – 5 years)

[1] Funding for private entities for R&D projects of total project budget >$0.5M would be conditional on collaboration with a public research performer.
[2] Funding for private entities for Product Prototyping projects of total project budget >$2M would be conditional on collaboration with a public research performer.

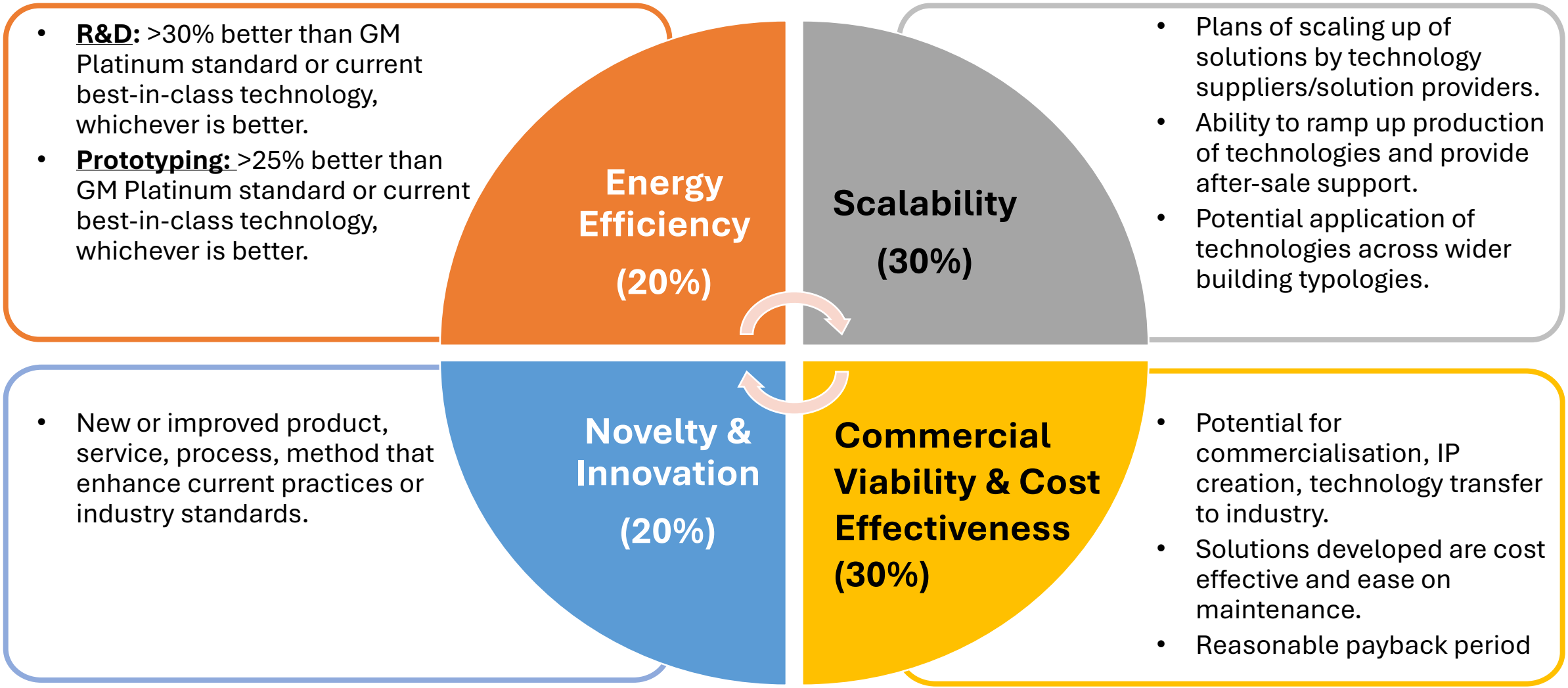
Project Phases

The project will consist of two phases:

Phase 1: Development	Development of a working prototype of the proposed solution.
Phase 2: Performance Validation	The developed solution to be testbedded in an operational environment at actual **Healthcare** building spaces to validate energy saving target, thermal comfort and indoor air quality.

Note:
Applicants could still submit their proposals before the closing date if they have not identified the building spaces for testbedding. Applicants can update BCA on the identified building spaces for testbedding, before the commencement of the Project Evaluation Panel meeting tentatively scheduled in Oct 2025.

Evaluation criteria



- **R&D:** >30% better than GM Platinum standard or current best-in-class technology, whichever is better.
- **Prototyping:** >25% better than GM Platinum standard or current best-in-class technology, whichever is better.

- Plans of scaling up of solutions by technology suppliers/solution providers.
- Ability to ramp up production of technologies and provide after-sale support.
- Potential application of technologies across wider building typologies.

- New or improved product, service, process, method that enhance current practices or industry standards.

- Potential for commercialisation, IP creation, technology transfer to industry.
- Solutions developed are cost effective and ease on maintenance.
- Reasonable payback period

Submission Timeline

Submission:

Applicants can download the required documents from the SLEB Smart Hub.

Please submit through the Integrated Grant Management System (IGMS) at https://www.researchgrant.gov.sg/ with the supporting documents by **14 Aug 2025, 5:00 PM** (Singapore time).

For more information on the Challenge Call, please visit https://www1.bca.gov.sg/buildsg/buildsg-transformation-fund/green-buildings-innovation-cluster-gbic-programme

Any question, please write to BCA_Challenge_Call@bca.gov.sg.

Challenge Statement 1: Sengkang General Hospital

Challenge statement

To implement an innovative dynamic setpoint control system that adjusts operational parameters in real-time based on current conditions, thereby optimizing energy use and improving overall system performance.

Current situation

The chiller plant operates under a traditional model that relies on fixed setpoints for temperature and cooling load controls, resulting in:

- Overcooling/undercooling wastes energy
- Chillers running at full capacity despite low demand
- No adaptation to external temperatures, occupancy, or equipment loads
- Results in occupant discomfort and higher costs

Gaps to be addressed

- Fixed setpoints cannot adapt to external variations
- Integration challenges between dynamic control and existing BMS
- Overall operational efficiency affected

Contact Person's Details: Edward Reuben (Roch.edward.reuben@skh.com.sg, Sustainability.office@skh.com.sg)

Challenge Statement 2: Singhealth Tower/ Outram Community Hospital

Challenge statement

To develop solutions to prevent mould growth in L4 floor areas without 24/7 AC operation. Solutions must be:

- Cost and energy efficient
- Compliant with hospital's infection control requirements

Current situation

Existing mould management measures includes:

- Anti-mould paint application
- Ceiling board replacement when needed
- Airflow adjustments
- Use of dehumidifier

Gaps to be addressed

The floor consists of a lot of small compartments and the air-conditioning operates only during office hours, resulting in spike in RH level after the AC is switched off, promoting mould growth.

Contact Person's Details:
Foo Seck Sen: foo.seck.sen@singhealth.com.sg
Lim Kian Giap: lim.kian.giap@singhealth.com.sg
Ryan Thio: ryan.thio.t.j@singhealth.com.sg

Challenge Statement 3: KK Women's and Children's Hospital *NEW*

Challenge statement

- To seek innovative solutions to enhance thermal comfort in NV spaces without implementing convectional AC systems
- To seek innovative façade treatment solutions to enhance thermal performance and energy efficiency for existing buildings.

Current situation

Designed and constructed under older architectural standards, KKH is experiencing:

- Poor thermal comfort in NV spaces
- High heat gain through the facades

Gaps to be addressed

- Enhancement to design or solutions to improve building users' thermal comfort in NV spaces
- Enhancement to façade resulting in better thermal performance and lower cooling demand

Contact Person's Details:

Alan Liang: alan.liang.wk@khh.com.sg

Keegen Tan: keegen.tan@kkh.com.sg

Focus Areas

There are two focus areas covered under 2nd Thematic Challenge Call for R&I Scheme for Healthcare buildings.

Innovative Cooling Technologies | Advanced Building Ventilation Solutions

Scope (at least one of the scope):

- Develop cost-effective, compact non-vapour compression cooling system and evaporative cooling system (using water as refrigerant) with good dehumidification control suitable for large building indoor applications for tropical climate environment conditions.
- Review various possible combination of multiple modes of hybrid AC and natural ventilation systems that could address air momentum, condensation, low cooling capacity and humidity control challenges.
- Solutions developed are required to be compact, durable, cost effective and low maintenance with high energy efficiency, Indoor Air Quality (IAQ), and thermal comfort performance.

Examples (non-exhaustive):

- Non-vapour compression technologies
- Integrated advanced dehumidification system with evaporative cooling
- Advanced energy recovery technologies for building applications

Focus Areas

There are two focus areas covered under 2nd Thematic Challenge Call for R&I Scheme for Healthcare buildings.

Innovative Cooling Technologies	**Advanced Building Ventilation Solutions**

Scope (at least one of the scope):

- Develop novel, cost effective materials and designs, such as permeable facade and breathing facades which will reduce indoor humidity within the building using porous materials.
- Study the integration between the façade as a building skin with other building systems e.g. ACMV, BMS, to achieve greater energy savings.
- Study the occupant ventilation system relying on improved monitoring of occupancy conditions (i.e. presence, comfort, and adaptive behaviour) and incorporation of these parameters into control strategies in a timely fashion to reduce unnecessary energy usage.
- Review and identify the key factors of aerodynamic fans combining with natural ventilation (NV) and evaluate the effectiveness of the solutions including energy efficiency and ventilation effectiveness.

Examples (non-exhaustive):

- Smart ventilation system based on climate-responsive solutions
- High energy efficient air filtration system
- Advanced building envelope system that incorporates fresh air intake into façade systems reducing cooling load and improving humidity control & IAQ.

Thank you

@BCASingapore

Any other questions, please email to us at BCA_Challenge_Call@bca.gov.sg

Frequently Asked Questions

Q1: Can I submit more than one proposal for each challenge statement?

A1: Yes, you may submit multiple proposals, but each proposal must be different.

Q2: How will I know if my application is shortlisted?

A2: We aim to inform shortlisted participants via email by 31st March 2026 with instructions on the next steps. However, the timeline may be subject to changes depending on prevailing circumstances.

Q3: What will be the levels of support for projects comprising private sector entities and IHLs/RIs?

A3: The funding level will be pegged to the entity classification of the participating organisations in the project. For example, qualified cost items from SME firm will be supported up to 70%; qualified cost items from LLE firm will be supported up to 50%; qualified cost items from non-Singapore firm will be supported up to 30% and qualified cost items from local IHL/RI will be supported up to 100%.

Q4: May I request an extension of time to submit my proposal?

A4: We encourage you to submit your proposal endorsed by your organisation by the given deadline. We will not be able to grant any extension of time for late submissions.

Q5: Do I need to attend the briefing to be eligible to participate in the Challenge Call?

A5: No, applicants are still eligible to participate in the Challenge Call. For interested applicants who had missed the industry briefing, you may refer to the industry briefing slides on SLEB Smart Hub after 7 July 2025 and submit your application via IGMS or email to BCA_Challenge_Call@bca.gov.sg for R&I proposals and Demonstration proposals respectively by 14 August 2025, 5:00 PM.

Frequently Asked Questions (Demo)

Q6: I am interested to be part of a consortium for the Demonstration challenge call, is there a list of ESD consultants I can approach?

A6: You can refer to the list of consultants registered with SGBC (professional building and environmental consultants) Singapore Green Building Council**.**

Q7: Can the consortium select any buildings for the demonstration?

A7: Yes, apart from the predefined buildings mentioned in the GBIC 2.0 2nd Thematic Challenge Call Information Document, you may select other buildings as long as it falls into the Healthcare, Retail, Mixed Development and Hotel sectors, and if the developers/building owners have no objection.

Q8: Will the consortium be able to meet with the building owners issuing the challenge statement?

A8: You may approach the building owners to request and arrange to meet up. The email addresses of the Point of Contact are provided in the Challenge Call documents.

Q9: What are the documents I would need to submit if I am participating in the Demonstration Challenge Call?

A9: You would need to submit the completed GBIC Demonstration Application Form and the list of documents mentioned in the application form.

Q10: I am a global technology firm without any presence in Singapore. Am I allowed to participate in the Challenge Call?

A10: We would advise you to partner with a Singapore registered company or ESD Consultant if you are interested in participating in the Challenge Call.

Frequently Asked Questions (R&I)

Q11: Can my company engage our preferred building owners for the testbedding phase?

A11: Yes, you may approach building owners of your preference from the healthcare sector for R&I proposals. BCA would evaluate the suitability of other building typologies such as such as commercial offices, retail spaces, and hotels on case-by-case basis. We encourage applicants to reach out to BCA for clarifications if needed.

Q12: What are your policies on intellectual property ("IP") protection and confidentiality obligations?

A12: The participant is solely responsible for protecting their IP rights in their submission. Once an application is submitted and selected for trial with the project collaborator(s), the protection of IP rights in the submission shall be privately agreed upon between the collaborator(s) and the participant. We encourage participants to enter into agreements with the collaborator(s) on ownership, licensing, and exploitation of foreground IP to encourage commercialisation and market adoption.

Q13: Does my company need to collaborate with IHL/RI as part of the project team members?

A13: Funding for private sector entities for R&D projects (total project budget >$0.5M) and Product Prototyping projects (total project budget >$2M) would be conditional on collaboration with a public research performer.

Q14: My company is a foreign MNC firm based in Singapore. Can we involve our global R&I partners/colleagues who are based overseas to be project team members?

A14: Yes, overseas expert involvement is allowed as long as it contributes to the project's goals. However, funding awarded cannot be used to support overseas R&I activities and testbedding activities outside of Singapore unless approved in the grant.

Q15: I am a global technology firm without any presence in Singapore. Am I allowed to participate in the Challenge Call?

A15: We advise you to partner with a Singapore solution providers or IHL/RI if you are interested in participating in the Challenge Call.

Frequently Asked Questions (R&I)

Q16: Can we involve a co-PI from overseas and what is the funding policy for that?

A16: Involvement of overseas experts for the project is encouraged if they can value add to the goals of the research projects. Funding support would typically cover their costs of carrying out R&I activities in Singapore. Funding awarded cannot be used to support overseas R&I activities outside of Singapore unless approved in the grant. For more information on fundable and non-fundable items, please refer to the **Guidelines for the Management of Research Grants** document available on SLEB Smart Hub and the Integrated Grants Management System (IGMS).

Q17: Can the funding be provided to the solution provider or to the building owner who will be procuring the solution?

A17: Funding will be provided to eligible PI, co-PI of the project team. PI, co-PI should provide the project budgets needed for the project such as manpower, equipment, material, testing services etc and seek the funding support. For more information on fundable and non-fundable items, please refer to the **Guidelines for the Management of Research Grants** document available on SLEB Smart Hub and the Integrated Grants Management System (IGMS).

Q18: Is engaging testing services for testbedding phase supportable?

A18: Engaging testing services for measurement and verification (M&V) of the performance of the solutions are generally supportable. For more information on fundable and non-fundable items, please refer to the **Guidelines for the Management of Research Grants** document available on SLEB Smart Hub and the Integrated Grants Management System (IGMS).

Q19: Is there a maximum and minimum numbers of the PI and co-PI in a proposal?

A19: Minimally, a proposal should comprise at least one lead PI. The number of co-PIs that are needed would depend on whether the proposal's scope covers multi-disciplines and with several deliverables.

Frequently Asked Questions (R&I)

Q20: If the building where we would like to testbed our solution has already been certified as GM Platinum, does this mean that our solution needs to achieve 30% better than our existing performance?

A20: The target set for R&D or Product Prototyping proposal refers to the equipment/ system energy efficient target, not for the target for entire building EUI. For example, if the solution is to improve chiller plant system energy efficiency, the target is to be 25% or 30% better than GM2021 Platinum standard for chiller plant efficiency which is 0.56 kW/RT or current best-in-class chiller plant performance, whichever is better. Please see below Table 3 of the GBIC 2.0 2nd Thematic Challenge Call Information Document.
The applicant could address one or more of the areas mentioned in Table 3.

Q21: Is there a timeframe in which the research needs to be conducted and what is the duration needed for testbedding M&V phase?

A21: Project should be ready to commence as soon as possible after the project is awarded. Project team could write in to BCA if more time is needed to kick start the project. As for the testbedding duration, it would depend on the extent of the testbedding that is being proposed in the proposal. Typically, it would be around 3 – 6 months.

Q22: What is the definition of "best-in-class solutions" for each of the different systems?

A22: GM2021 Platinum standard in Table 3 of the GBIC 2.0 2nd Thematic Challenge Call Information Document is used as proxy for best-in-class performance. However, if there is better performance solution available in the market than what were stated in Table 3, we would use the better performance target for the proposal. We trust the solution providers will have a deeper understanding of what is available in the existing market and to conduct a tech scan of the performance of similar products.

Table 2: Technology Readiness Level Descriptions

The Technology Readiness Level (TRL) is widely used indictor of the degree of development or a technology toward deployment, measured on a scale of 1-9.

Level	Definition	Description
TRL 1	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world.
TRL 2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be formulated. Applications are speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
TRL 3	Analytical and experimental critical function and/or characteristic Proof of Concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated, or representative tested with simulants.
TRL 4	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system.
TRL 5	Laboratory scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity, laboratory scale system in a simulated environment.
TRL 6	Engineering/pilot-scale, similar (prototypical) system validation in relevant environment	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.
TRL 7	Full-scale, similar (prototypical) system demonstrated in relevant environment	Prototype near or at planned operational system – Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment.
TRL 8	Actual system completed and qualified through test and demonstration.	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development.
TRL 9	Actual system operated over the full range of expected conditions.	The technology is in its final form and operated under the full range of operating conditions.

Table 3: R&I Challenge Call Targets

	GM 2021 Platinum Standard	Product Prototyping Target (25% better the GM Platinum standard or existing best-in-class solutions, whichever is better)	R&D Target (30% better the GM Platinum standard or existing best-in-class solutions, whichever is better)
Chiller plant system efficiency (kW/RT)	0.56	0.420	0.392
Air side efficiency (kW/RT)	0.18	0.135	0.126
Total AC system efficiency (including water side and air side) (kW/RT)	0.74	0.555	0.518
Lighting (W/m^2) - Office/Meeting Room - Hotel Guest Room	 5.5 7.0	 4.125 5.250	 3.85 4.90
Mechanical Ventilation (W/CMH) • > 4kW • < 4kW	 0.28 0.17	 0.210 0.128	 0.196 0.119
Reduced Heat Gain (ETTV) (W/m^2) - Office Building - Hotel	 38 40	 28.5 30.0	 26.6 28.0

Definition of Various Enterprise Segments & Funding Support

S/N	Type	Criteria	Max funding support
1	All non-SG private sector entities	• <30% local shareholding, determined by the ultimate individual ownership	30%
2	Large Local Enterprises (LLEs)	• ≥ 30% local shareholding; and • More than $100M in annual turnover	50%
3	SG Small and Medium Enterprises (SMEs)	• Have group Annual Sales Turnover of not more than $100M, or maximum employment of 200 employees • To qualify as an SG entity, they must also have at least 30% local shareholding, i.e. local equity held directly or indirectly by Singaporean (s) and/or Singapore PR(s)	70%
4	SG Start-ups	• Registered for less than 5 years at time of grant application • Has individual ownership of more than 50% at reference year; and • Employs at least 1 worker • To qualify as an SG entity, they must also have at least 30% local shareholding	
5	SG Not-for-profits	• Registered as a public Company Limited by guarantee, society or charity trust • Main purpose is to support or engage in activities of public or private interest without any commercial or monetary profit, and are prohibited from distributing monetary residual to their own members • To qualify as an SG not-to-profit, the entity must meet all 3 of the following criteria: (1) Registered and physically present in Singapore; (2) Core funding (i.e. excl. competitive grant funding) is derived entirely/mostly from SG entities; (30 Managed by a Board, which is at least half appointed by SG entities.	

Annex: Guidance for Creation of New Companies/Institution in IGMS

Creation of New IGMS Account

Step 1: Registering the Host Institution (HI)

- For the creation of **new** Host Institution (HI) in IGMS, please provide the following details and in email to BCA_Challenge_Call@bca.gov.sg:

- *"Subject: Creation of new Company/Institution in IGMS for GBIC 2.0 2nd Thematic Challenge Call"*

  Details of the New HI:

  - *Full Name of Company:*
  - *Indicate Local Company or Foreign Company:*
  - *Indicate Public Company or Private Company:*
  - *UEN (for local company) or Entity ID (for foreign Company):*

For Foreign Company, please provide the screenshot from Corppass profile page indicating the Entity ID (for Foreign Company), for verification purpose. Refer to Appendix A.

For foreign company users who have an existing IGMS account via "For overseas users without Singpass", please refer to the Notes below.

For enquiries pertaining to IGMS system, please email IGMS helpdesk: Helpdesk@researchgrant.gov.sg.

Creation of New IGMS Account

Step 2: Creation of users under HI

i. The company will need to nominate a HI Admin.

ii. The **HI Admin** will need to have their Corppass account setup. Please refer to Corppass website for more info (www.corppass.gov.sg) on Corppass account matters.

iii. The **HI Admin** will need to log in to IGMS via "**For Business Users**" to register an account and update their profile in IGMS. Please note that the IGMS would grant them the **Principal Investigator (PI)** role by default.

*For foreign company users who have an **existing IGMS** account via "**For overseas users without Singpass**", please refer to the Notes below.

iv. After the **HI Admin** has been successfully registered in IGMS, the **HI Admin** will notify BCA in email with the information below, to change the role of the person from a **PI** to a **HI Admin**:

- *Full Name of HI Admin:*
- *E-mail Address of HI Admin:*
- *Designation of HI Admin in the company:*

v. Once granted the role as a **HI Admin**, companies can proceed to assign the relevant roles (e.g. Office of Research (ORE), Director of Research (DOR), PI, etc) to the various users within the organisation.

For enquiries pertaining to IGMS system, please email IGMS helpdesk: Helpdesk@researchgrant.gov.sg.

Creation of New IGMS Account

Notes:

For **existing** foreign company users who have an IGMS account registered via "**For overseas users without Singpass**" route.

- Users should contact Corppass to register for and obtain a Corppass account. Please refer to Corppass website (www.corppass.gov.sg) and their FAQ section (go.gov.sg/corporate-login) for more info.
- Since the company had registered in IGMS before, once the Corppass account has been obtained, please follow Step 1 (Registering the Host Institution) above, to **update** your company with the **newly issued Entity ID (for Foreign Company)** in IGMS, before proceeding further.
- After Step 1 is completed, when registering in IGMS via "**For Business Users**", ensure to register using the **same email address** that was used for the existing IGMS account.

  [Important!] In order to continue accessing past transactions in IGMS, it is important the above steps are done to (i) update the new Entity ID in IGMS, and (ii) to register via "**For Business Users**" with the same email address.
- The rest of the steps under Step 2 (Creation of users under HI) remains the same.

For enquiries pertaining to IGMS system, please email IGMS helpdesk: Helpdesk@researchgrant.gov.sg.

Creation of New IGMS Account

Role of HI Admin

- To complete a proposal submission, **3 distinct roles** are required from any company or institution to endorse the proposal, namely:
    1. Lead Principal Investigator (PI)
    2. Office of Research (ORE) and
    3. Director of Research (DOR)
- The HI Admin will manage the roles of the users in their company or institution and can concurrently hold the role of Lead PI.
- HI Admin will be able to select different profiles upon login to IGMS:
    - Login as HI Admin – to maintain institution & user profiles
    - Login as PI – to apply for grant call

"Host Institution" means the body or institution or administering organisation named in the Letter of Award as the "Host Institution" as the body responsible for undertaking and managing the Research.

"Lead Principal Investigator" means the Investigator identified in the Letter of Award as the overall lead in the conduct of the Research.

"Office of Research" means the office established by the Host Institution to facilitate administering and coordinating all matters relating to the Research.

"Director of Research" means the person identified as leading the Office of Research.