

SUSTAINABLE ENERGY MANAGEMENT AND OPTIMISATION THROUGH SMART AUTOMATION SOLUTIONS

CONTEXT

Lendlease Global Commercial REIT (LREIT) is a globally integrated real estate company that creates and invests in communities, workplaces, retail, and infrastructure projects. In Singapore, LREIT manages a mix of residential, retail and commercial properties, including malls like 313@Somerset and Jem which are owned by LREIT, and Paya Lebar Quarter and Parkway Parade under Lendlease Investment Management. With the aim to reach the highest sustainability standards and to contribute to the Jurong Lake District's (JLD) vision of shaping a sustainable future, LREIT is looking to testbed innovative solutions in Jem that have potential scalability to other buildings in JLD.

LREIT has set a target of 'Absolute Zero Carbon by 2040' – no greenhouse gas emissions from business activities. Currently, properties under LREIT are all net zero carbon. LREIT is looking into innovative solutions to enhance the energy efficiency of its buildings as a key means to decarbonise. In Jem, energy consumption has already been significantly reduced by upgrading chiller plants and pumps, making it one of the most energy-efficient buildings in JLD.

To further optimise energy efficiency, LREIT is looking into managing Jem's energy profile throughout the day. Currently, energy usage surges during lunch and dinner times, mainly to cool the building due to increased heat from heightened footfall. LREIT would like to reduce the surge as much as possible to put less stress on its facilities and reduce the energy consumption needed to cool a space rapidly, while achieving optimal thermal comfort for visitors and building occupants.

This sector-wide challenge is supported by the Urban Redevelopment Authority (URA) and Smart Nation & Digital Government Office (SNDGO) for the development of sustainability and smart nation initiatives within Jurong Lake District.

PROBLEM STATEMENT

How might we design a smart building management system that can optimise energy consumption throughout the day while still delivering thermal comfort to building occupants?

WHAT ARE WE LOOKING FOR?

LREIT is looking for a solution that enables Jem to optimise energy efficiency by adapting to changes in visitor numbers and energy needs throughout the day, without compromising thermal comfort.

The solution should consider the following:

- Real-time environmental monitoring and adjustments to optimise thermal comfort. The solution should assist the Jem facility management system in sensing, capturing and monitoring the volume and movement of crowds in different spaces throughout the day. The captured data will be used to recognise and/or predict heat accumulation in a location and adapt the intensities of Jem's existing lighting (internal / external), cooling (PAHUs / AHUs / FCUs) and ventilation systems to optimise energy efficiency/savings while still delivering thermal comfort and adequate ventilation to all visitors / occupants within the various "microclimates" in Jem, so that they feel comfortable wherever they are in the building. The system should be able to continually analyse and learn from past data in order to adapt with increased efficiency.
- Data integrator. The solution should be able to integrate climatic/weather data from multiple sources within JLD to provide an accurate level of thermal comfort for visitors stepping into or moving within Jem.

- Data analytics and insights. The solution should provide metrics / indicators that can be used to highlight energy efficiency, carbon emissions, Indoor Air Quality and other well-being improvements to Jem and LREIT stakeholders. It should give additional insights into Jem's energy profile and provide indications of where energy is possibly being wasted, to inform the LREIT team's future action.

OVERALL PERFORMANCE REQUIREMENTS

- Dynamic and Responsive. The solution should provide accurate information on the present status of the accumulated heat in a location continuously, and respond to the build-up of heat quickly.
- Seamless transitions. Even though the solution adjusts energy usage dynamically to achieve customised "microclimates" within Jem, the adjustments should be non-intrusive and seamless such that visitors passing through different areas do not perceive abrupt changes in lighting, temperature, etc.
- Automated. The solution should be able to automatically make the necessary adjustments to energy usage with as few manual inputs as possible.
- Cost-effective. The solution should be cost-effective so as to maximise the savings in energy consumption.
- Scalable. The solution and its assets need to be plug-and-play and work with the current facilities operating management (Building Automation System from Johnson Controls) and metering systems in Jem, with the potential to be scaled to other buildings in JLD.
- Future-proof. The solution should consider possible changes in technology and be able to work with potential future solar energy capture capabilities.

There are no restrictions on the geographic location of the solution provider who may choose to apply to this challenge. However, the prototype needs to be demonstrated in Singapore. The solution provider should allow the solution to be tested for at least three (3) months in Jem (B1 and L1) from the completion of the prototype, before further refinement and potential full deployment.

Proposals that are non-digital or combine digital and non-digital components which address the challenge statement are welcome too and will be assessed accordingly.

POSSIBLE USE CASES

1. Adaptable intensity of electricity usage (e.g. lighting, air-conditioning etc). The intensity of lighting, air-conditioning and other electrical appliances react according to the crowd present within the building and the external environment to present the most comfortable conditions for visitors and optimise energy usage. For example, when crowd numbers are low, the air-conditioning is switched to only reducing humidity levels; the intensity of the lighting lumen and colour changes (for selected areas only) accordingly depending on the time of day, etc.
2. Visitors incentivised to visit Jem. Jack, a visitor to Jem, is sceptical about "green" features in malls, as his experience is that they typically compromise comfort. He prefers a colder air-conditioning setting to feel comfortable. However, upon stepping into Jem, he is surprised to find that the space feels cool enough. Even in crowded areas, the building is well-ventilated and does not feel stuffy.
3. Tenants see the value of green features. Jayden, the manager of a restaurant within Jem, feels happy that the facility management embodies sustainability values that resonate with her. Jayden advocates for the "green" features of the building and shares with her customers how the building intelligently adapts to the crowd.

WHAT'S IN IT FOR YOU

- S\$50,000 of prize money for each winner of this challenge (see Award Model)
- Access to IMDA's innovation consultancies (e.g. Design Thinking, Digital Storytelling, UI/UX) and PIXEL corporate innovation hub (e.g. hot-desking, project studios, ARVR, usability, 5G test labs) for prototyping and commercialisation
- Co-innovate with LREIT with access to their expertise, facilities, and human resources in developing the solution, and potential for the solution to be commercialised at Jem and other buildings within JLD
- Contribute to JLD's sustainability efforts and towards the collective green ambitions of the district, with profiling opportunities and potential to scale successful solutions within the district

EVALUATION CRITERIA

The evaluation process shall take place over two stages. Proposals shall be evaluated based on the evaluation criteria set out for the first stage. Thereafter, shortlisted proposals shall be subjected to a second stage evaluation in the form of an interview / pitch, and the scoring shall be based on a re-defined assessment criteria for the selection of the challenge finalist(s).

Solution Fit (30%)	<u>Relevance</u> : To what extent does the proposed solution address the problem statement effectively?
Solution Readiness (30%)	<u>Maturity</u> : How ready is the proposed solution to go to the market? <u>Scalability</u> : Is there any evidence to suggest capacity to scale?
Solution Advantage (20%)	<u>Quality of Innovation</u> : Is the solution cost effective and truly innovative? Does it make use of new technologies in the market, and can it potentially generate new IP?
Company Profile (20%)	<u>Business Traction</u> : Does the product have user and revenue traction? <u>Team Experience</u> : Do the team members possess strong scientific/technical background?

AWARD MODEL

30% of the prize money will be awarded to each selected finalist at the start of the POC/prototype development process. The remaining 70% will be awarded after completion of the POC/prototype solution, based on milestones agreed between the Problem Owner(s) and the solution provider. Prize money will be inclusive of any applicable taxes and duties that any of the parties may incur.

Note that a finalist who is selected to undertake the prototype development process will be required to:

- Enter into an agreement with the Problem Owner(s) that will include more detailed conditions pertaining to the prototype development;
- Complete an application form with IMDA that will require more financial and other related documents for potential co-funding support.

Teams with public research performers are required to seek an endorsement from their respective Innovation and Enterprise Office (IEO) and submit the IEO form together with the proposal.

SUBMISSION GUIDELINES AND DEADLINE

The proposal should include the following:

- 1 deck of slides in PDF format explaining the proposed solution, how it addresses the problem statement and meets the desired performance requirements. To include information such as the proposed cost model, data inputs, system that the proposed solution will run on, potential benefits, and the team's implementation plan.
- Video or pictures (300dpi) of any prototype or simulation, if applicable.
- Track record of the company/CV of the team.

All submissions must be made by **21 April 2023, 1600 hours (SGT/GMT +8)**. Problem Owner(s) and IMDA may extend the deadline of the submission at their discretion. Late submissions on the OIP, or submissions via GeBIZ, will not be considered.

Please visit <https://www.openinnovation.sg/challenges> to sign up for this challenge.