

Sustainable Smart Campus as a Living Lab

CALL FOR PROPOSALS

Brainstorming Workshop

30 Oct 2024



Workshop Agenda

1. Introduction of the Living Lab Program
2. HKUST Campus Sustainability Challenges
3. Living Lab Project Criteria & Funding
4. Breakout Groups & Brainstorming Session
5. Discussion on project feasibility

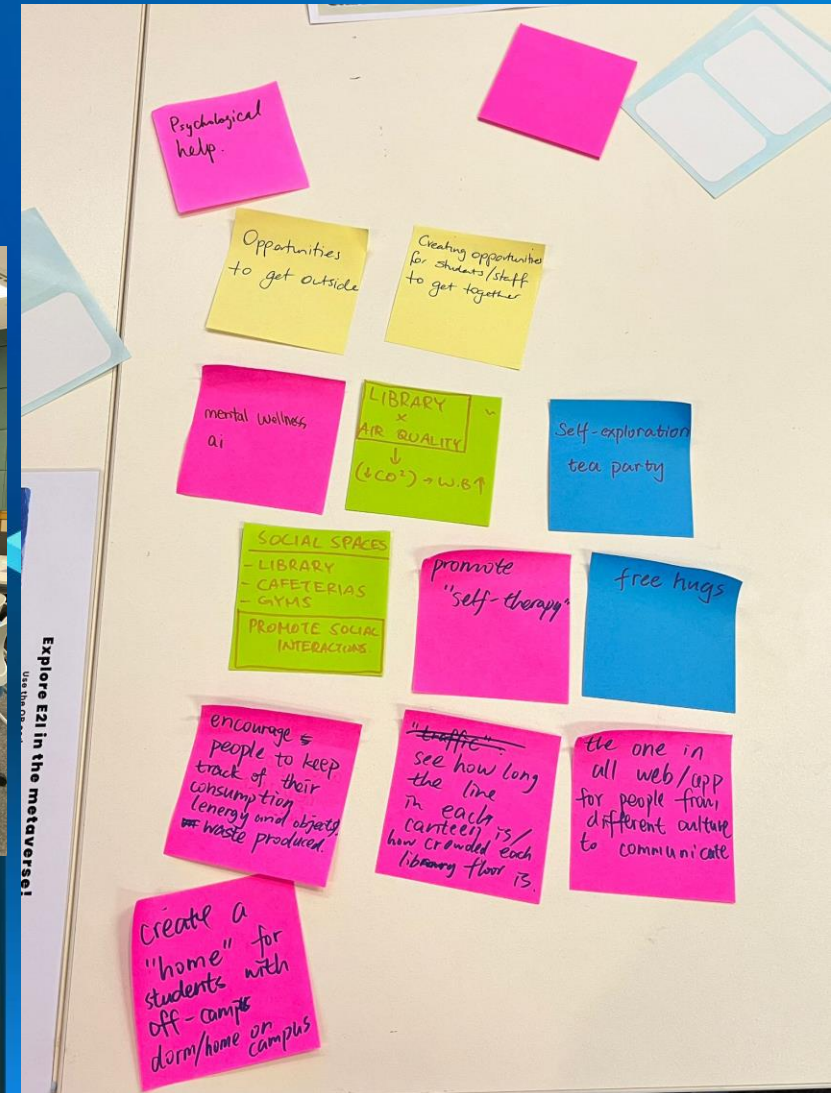


Workshop Aims

1. Understand how the Living Lab awarding criteria and process
2. Brainstorm new ideas that can be turned into innovative campus solutions.
3. Meet like-minded people who are interested in working together.

Workshop Outcome:
A set of viable ideas that
can become
Living Lab Proposals





Living Lab Program Intro & HKUST Sustainability Challenges

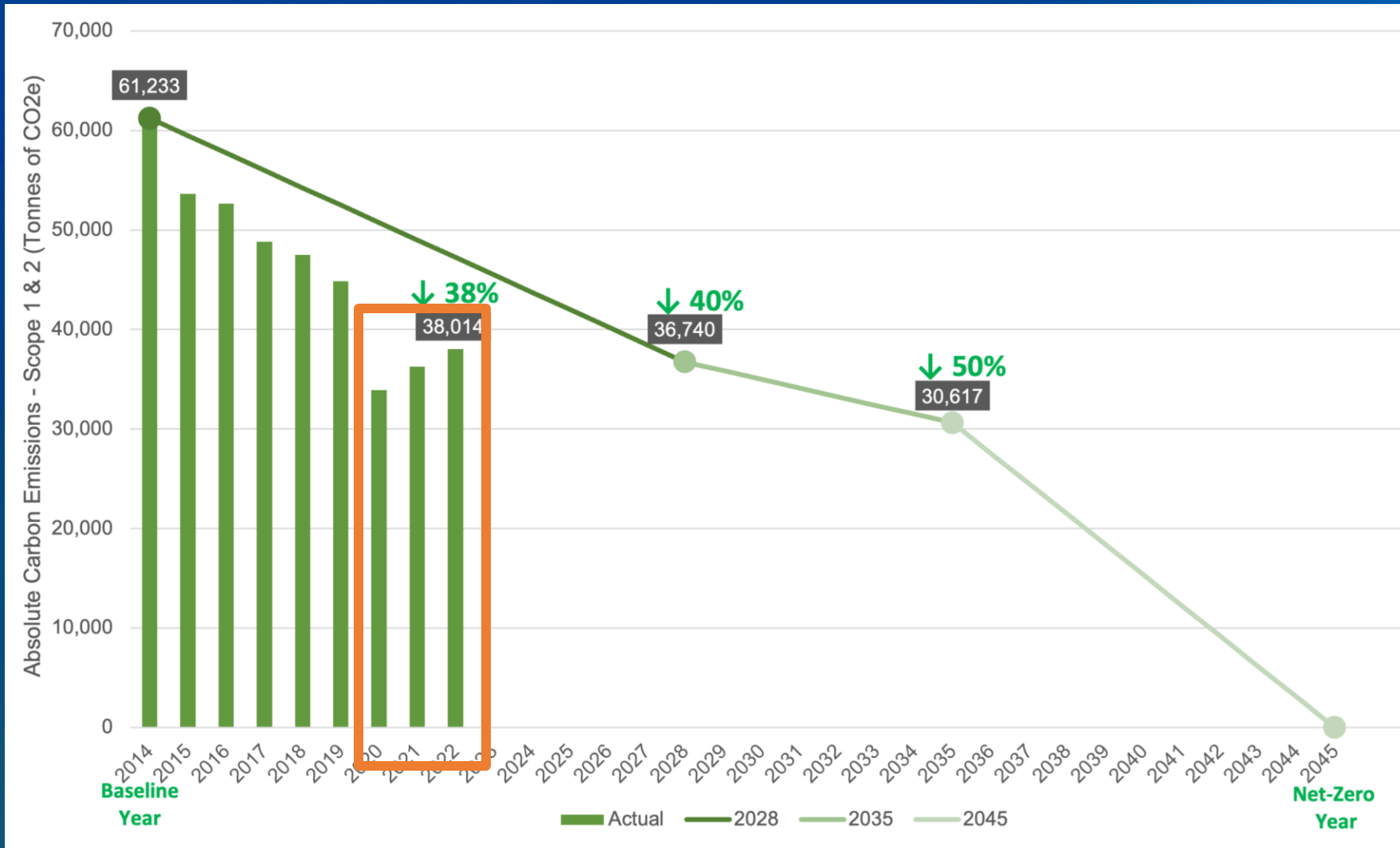
Marcus LEUNG-SHEA

Acting Director, Sustainability / Net-Zero Office

Co-Director, Sustainable Smart Campus as a Living Lab



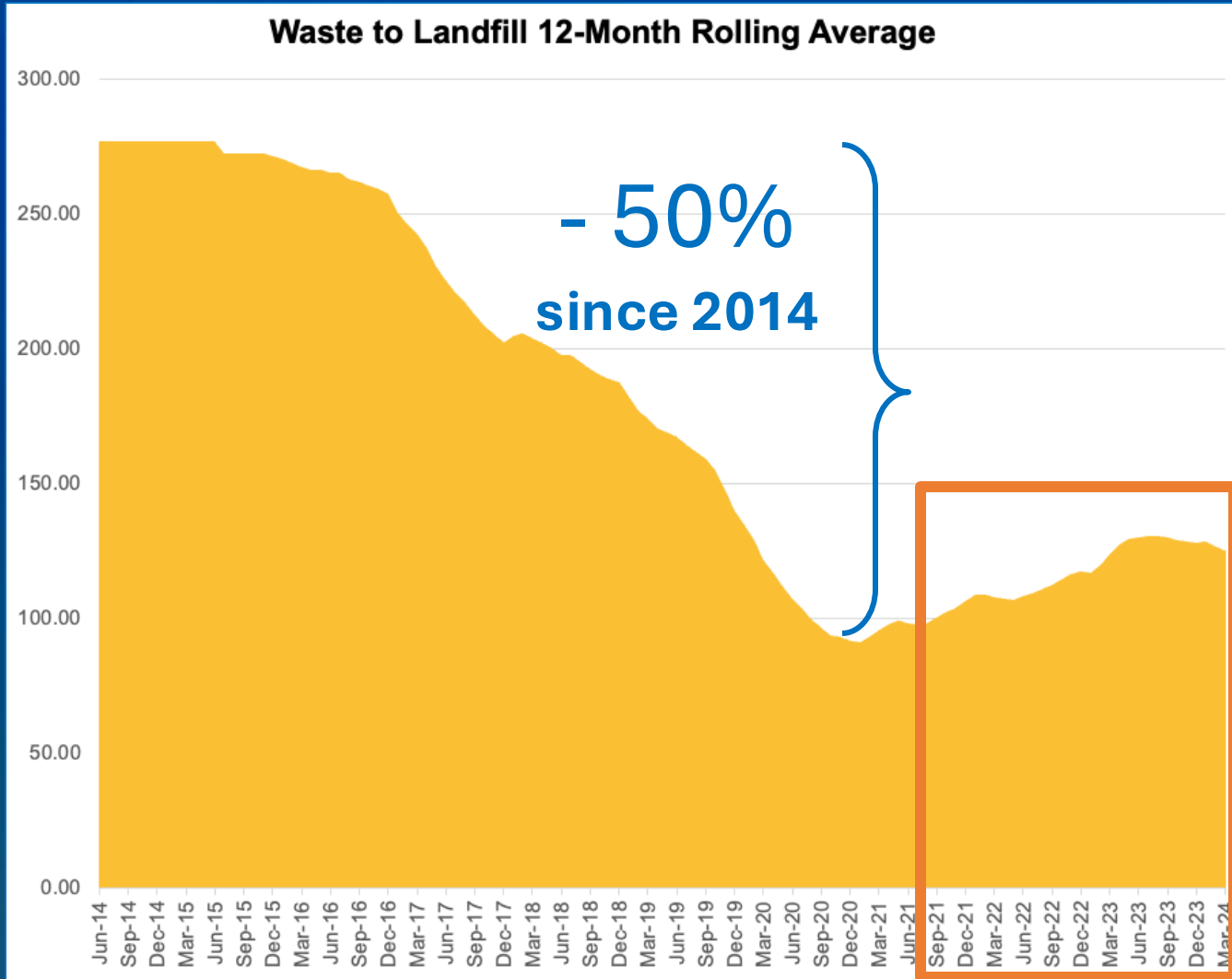
CARBON EMISSIONS



Targets:
-50% by 2035
Net-Zero by 2045



WASTE TO LANDFILL



Target: - 75% reduction





Innovation
showcase
for our
research

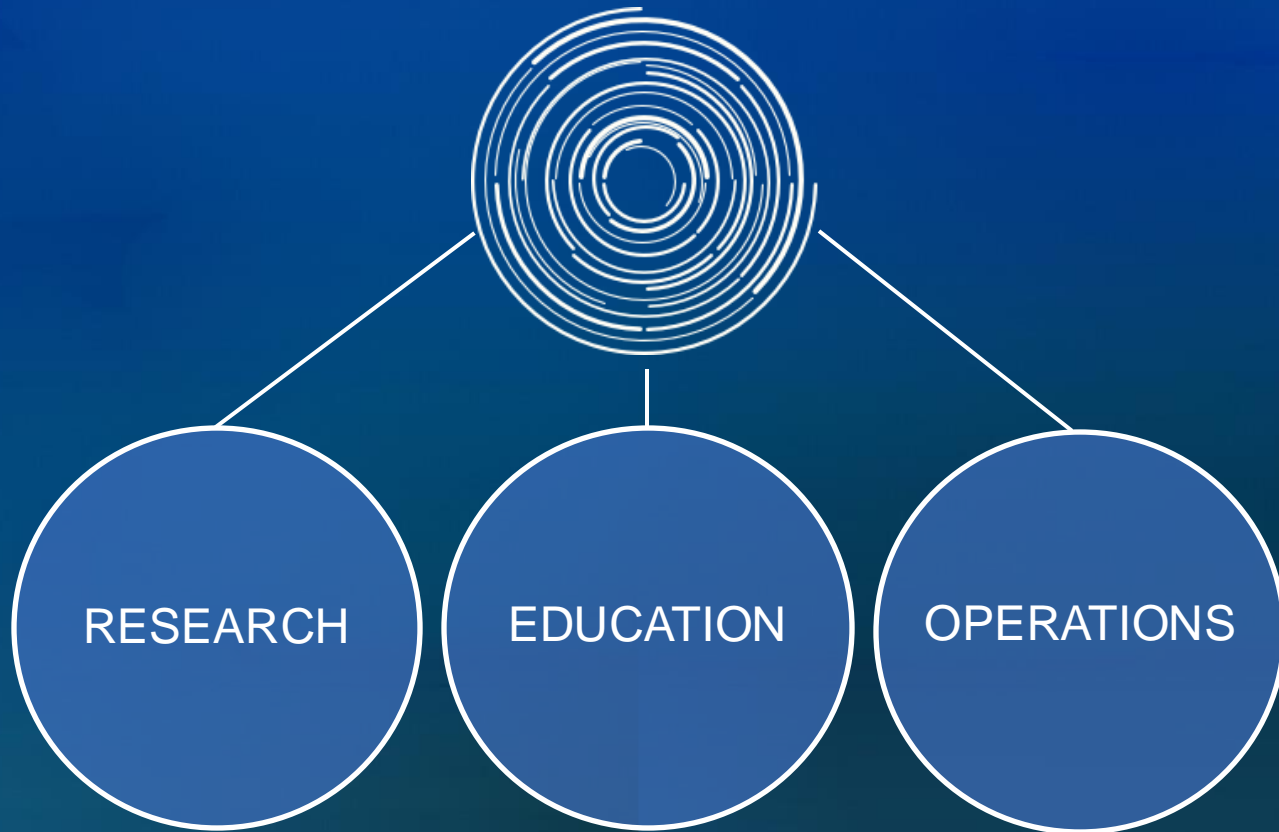
“Living Lab”
to enhance
experiential
learning

Test ideas
to address
campus
sustainability

How to make our
sustainability efforts visible,
measurable, and effective?



Sustainable Smart Campus as a Living Lab



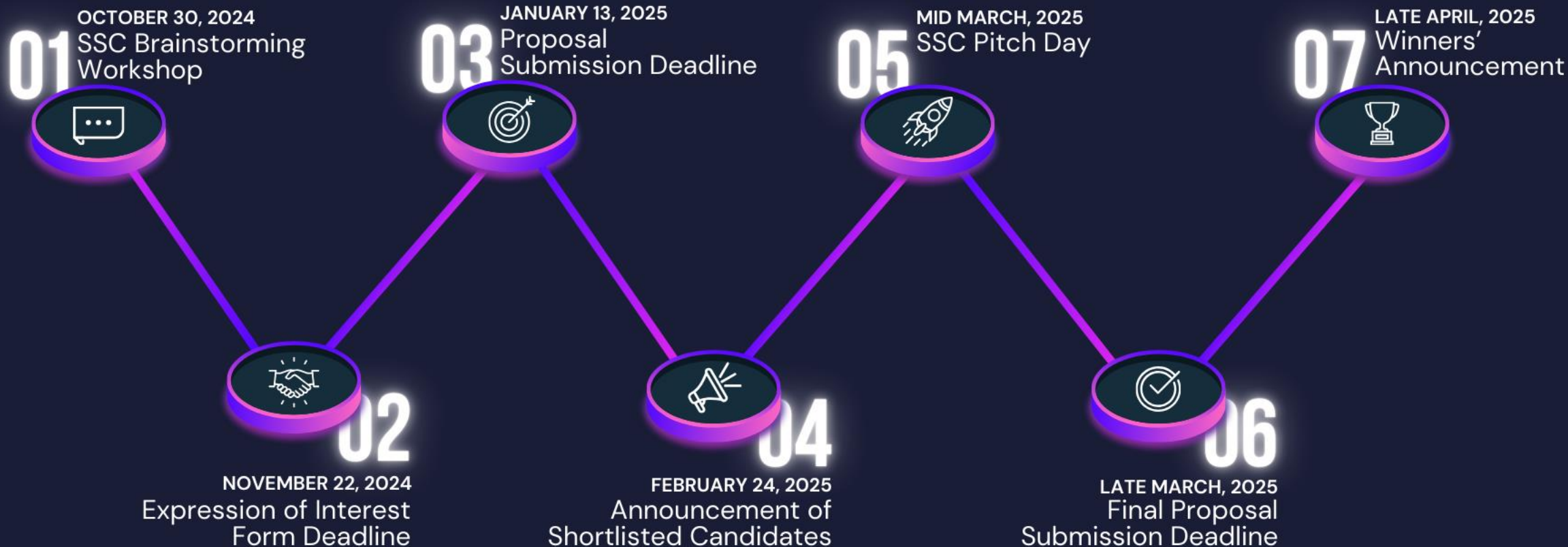
- Launched in 2019
- HK\$50 million commitment
- Proof-of-concept testing
- Fill gap in innovation pathway





Sustainable Smart Campus
as a Living Lab

Living Lab Program Roadmap





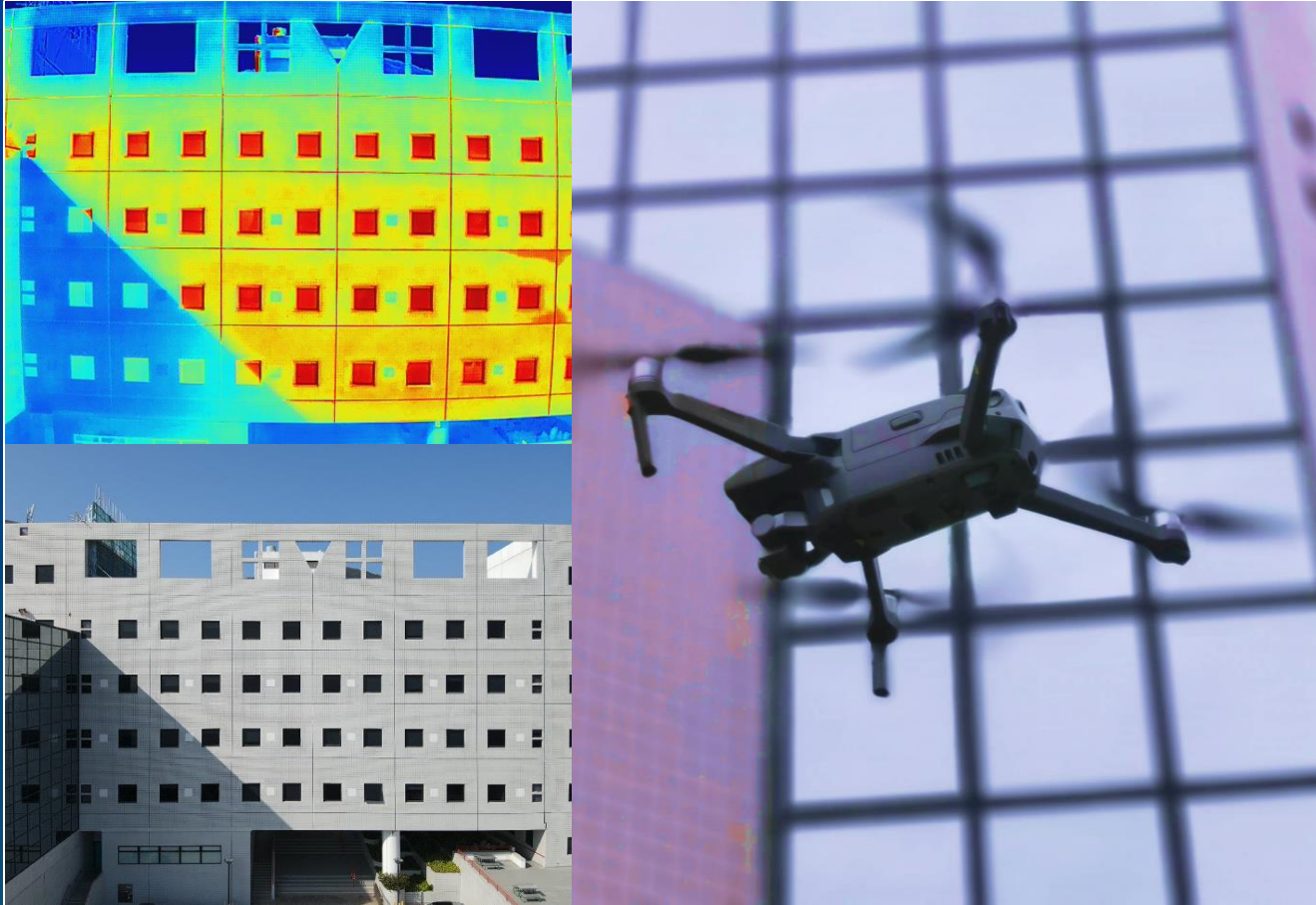
LIVING LAB APPROACH

Work together to iterate
proposals for real-world
impact



COMPETITION FOR IDEAS





LIVING LAB APPROACH

Fine-tune proposals with
input from operations
experts





LIVING LAB APPROACH

Use the physical campus
to advance your smart and
sustainable solutions



LIVING LAB: A CAMPUS FULL OF VISIBLE DEMONSTRATIONS



SSC Funding & Project Criteria

Professor Hong Kam LO

Dean of Engineering

Chair Professor, Department of Civil and Environmental Engineering

Co-Director, Sustainable Smart Cities as a Living Lab



Since **2019** : **\$50M** For 3 years : **41** Projects Funded : **850+** Students Involved : **250+** Faculty Involved : **500+** Partners Engaged

LIVING LAB PROJECT HIGHLIGHTS

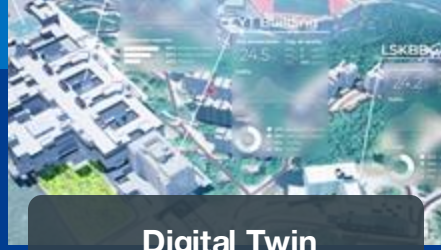
WE ACHIEVED



Aquaponics
Fish waste used for plant growth



Blockcerts
Blockchain certificates



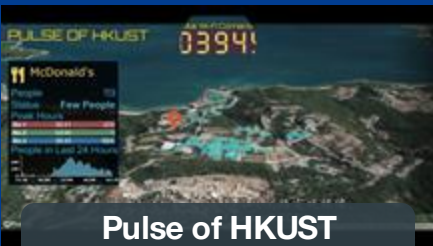
Digital Twin
Digital replica of HKUST



Algae-based CO2 capture system
Automatic Photobioreactor System



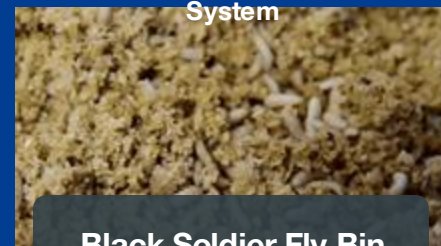
Food Waste Analytics
AI Camera to tracks waste
Patterns in canteens



Pulse of HKUST
Visualizes and predicts crowds
around campus



Smart Tracking Tray
Efficient chemical tracking and
storage in wet lab



Black Soldier Fly Bin
Reduce food waste with larvae



Nano-Coating
Applied on surfaces for
self-cleaning



Eco-brick
Mixing construction waste with
Ca-rich food waste



GGT Smart Campus
Monitor dormitory energy
consumption



Green Parking
Edge AI camera for license
plate recognition and vacancy
detection



LIVING LAB AS A STARTUP INCUBATOR



Eco-friendly
and low-carbon
construction
materials



Multi-functional
nanocoating for
windows and
solar panels



Smart
tracking tray
inventory
system for
wet labs



Low-carbon
elastocaloric
cooling for
fridges and
A/C



Digital replica
of HKUST's
physical
assets and
systems



Ideal Projects

Projects that can help transform the campus, generate excitement among our community, and serve as examples of smart solutions to difficult sustainability problems.

Criteria

1. Challenge Statement (20%)
2. Stage of development (10%)
3. Visibility and Educational Potential (20%)
4. Sustainable and Smart (15%)
5. Value for money (15%)
6. Potential Impact to the society (20%)
7. Market Potential (Bonus)



HKUST Sustainability Challenge Sharing



PERFORMANCE MEASURES

As a research university, members of the HKUST community are accustomed to tracking data and analyzing results. We have taken this same approach to campus sustainability so that we can better understand trends, performance, and areas of need.



Greenhouse Gas

Greenhouse gas refer to any gas that has the property of absorbing infrared radiation (net heat energy) emitted from Earth's surface and reradiating it back to Earth's surface, thus contributing to the greenhouse effect.

Inventory of greenhouse gases for HKUST includes all university sectors –Academic Buildings, Sport and Amenities Facilities, Student Housing Area, Staff Quarters, Caterers and Commercial Outlets, and all Public areas within the Clear Water Bay Campus.

[LEARN MORE](#)



Energy

Based on our strong conviction that energy is at the heart of many of Sustainable Development Goals, HKUST is committed to managing environmental footprints and integrating low-carbon measures into operations to avert the worst effects of a warming planet.

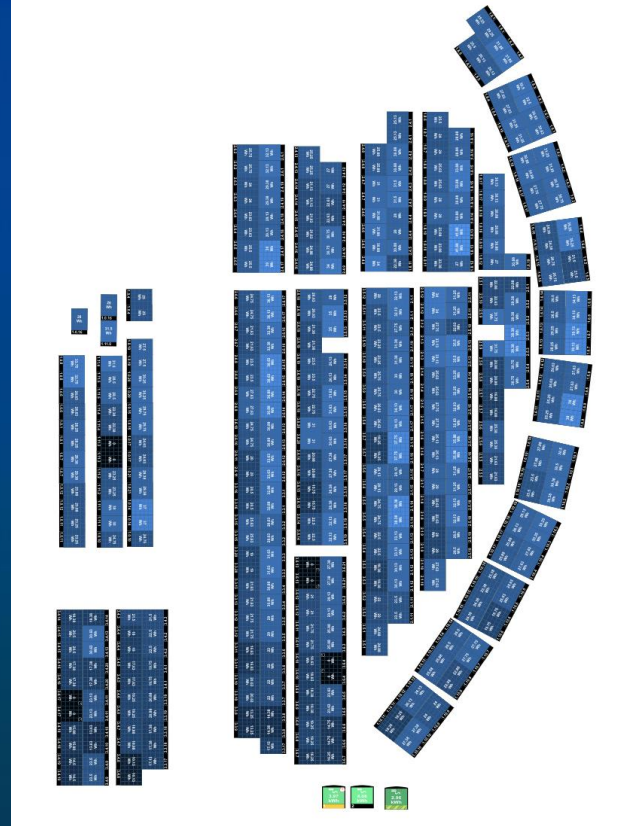
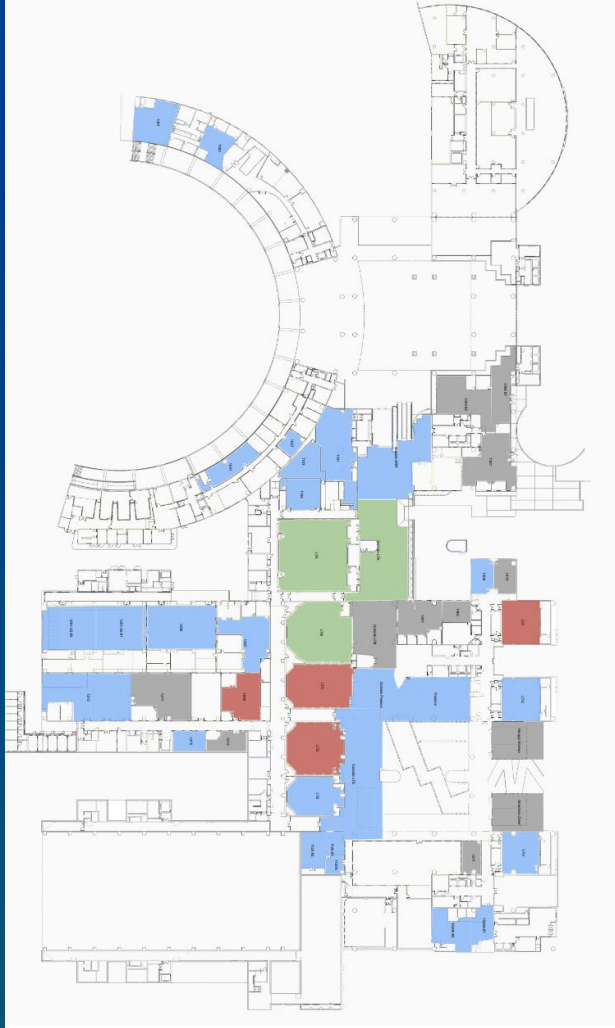
Electricity is the largest source of energy on campus, hence we are exponentially increasing our use of renewable energy.

[LEARN MORE](#)

CAMPUS OPS DATA

GHG, energy, water, waste, food waste, paper

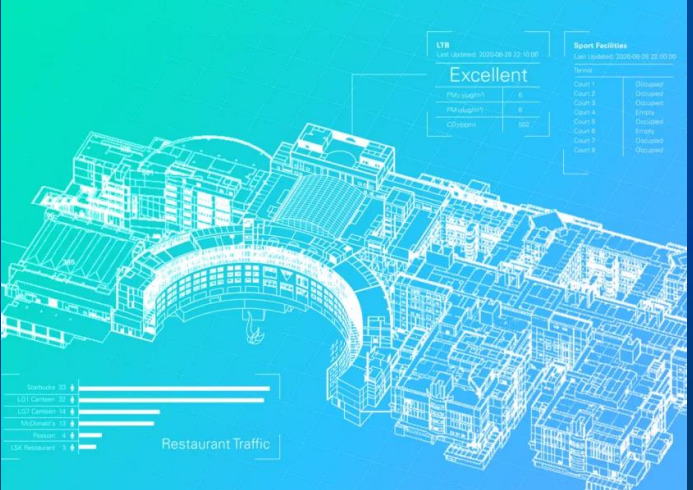
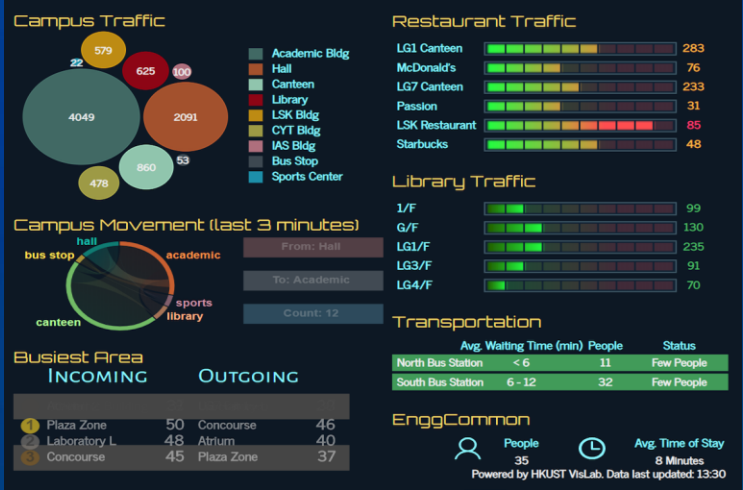




IOT DATA

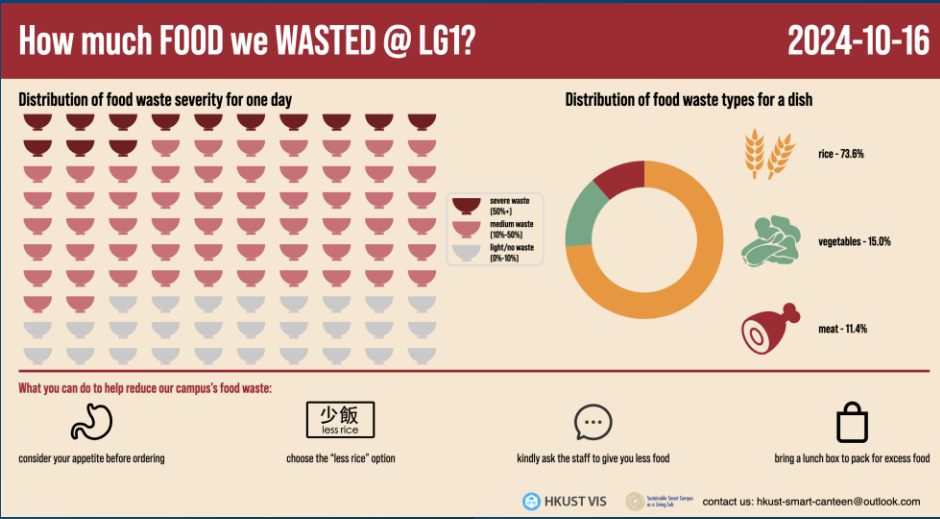
Temperature, humidity,
renewable energy



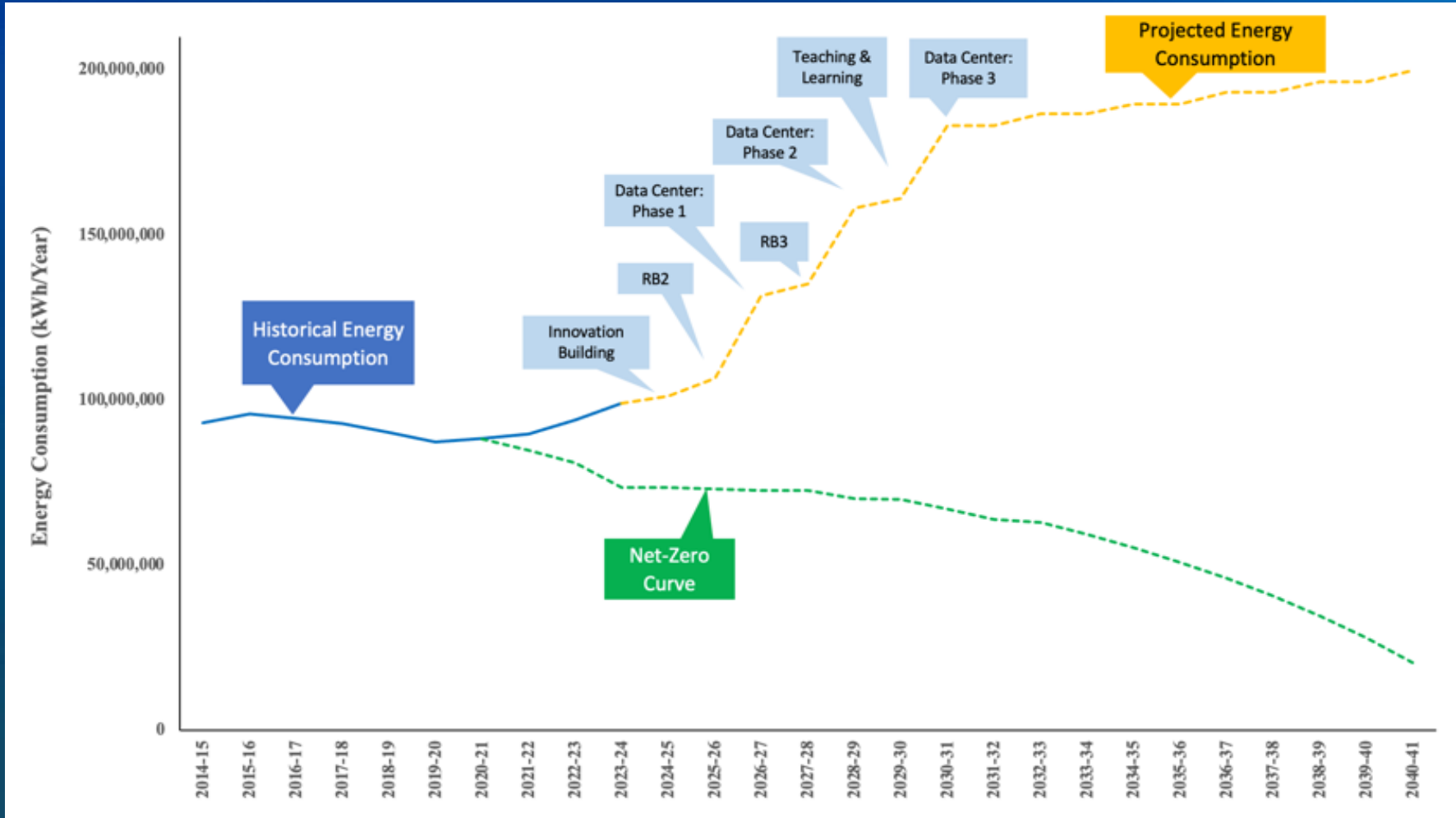


SMART DATA

Crowd, real-time food waste, digital twin, air quality



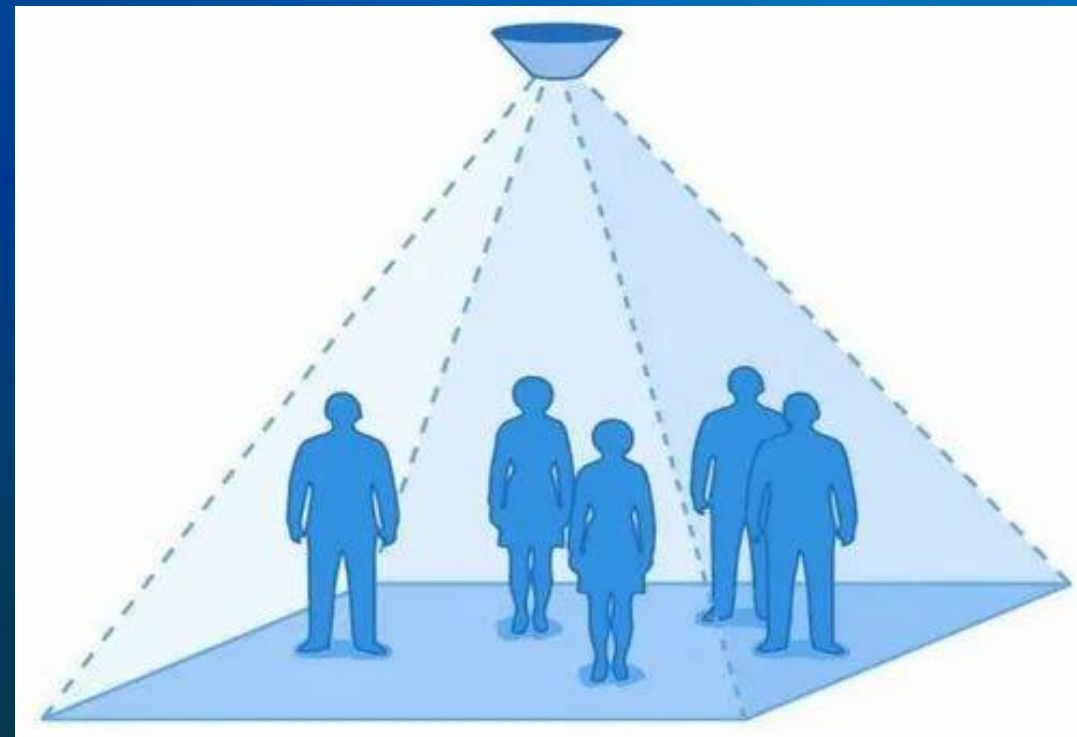
ENERGY & GREENHOUSE GAS EMISSIONS CHALLENGE



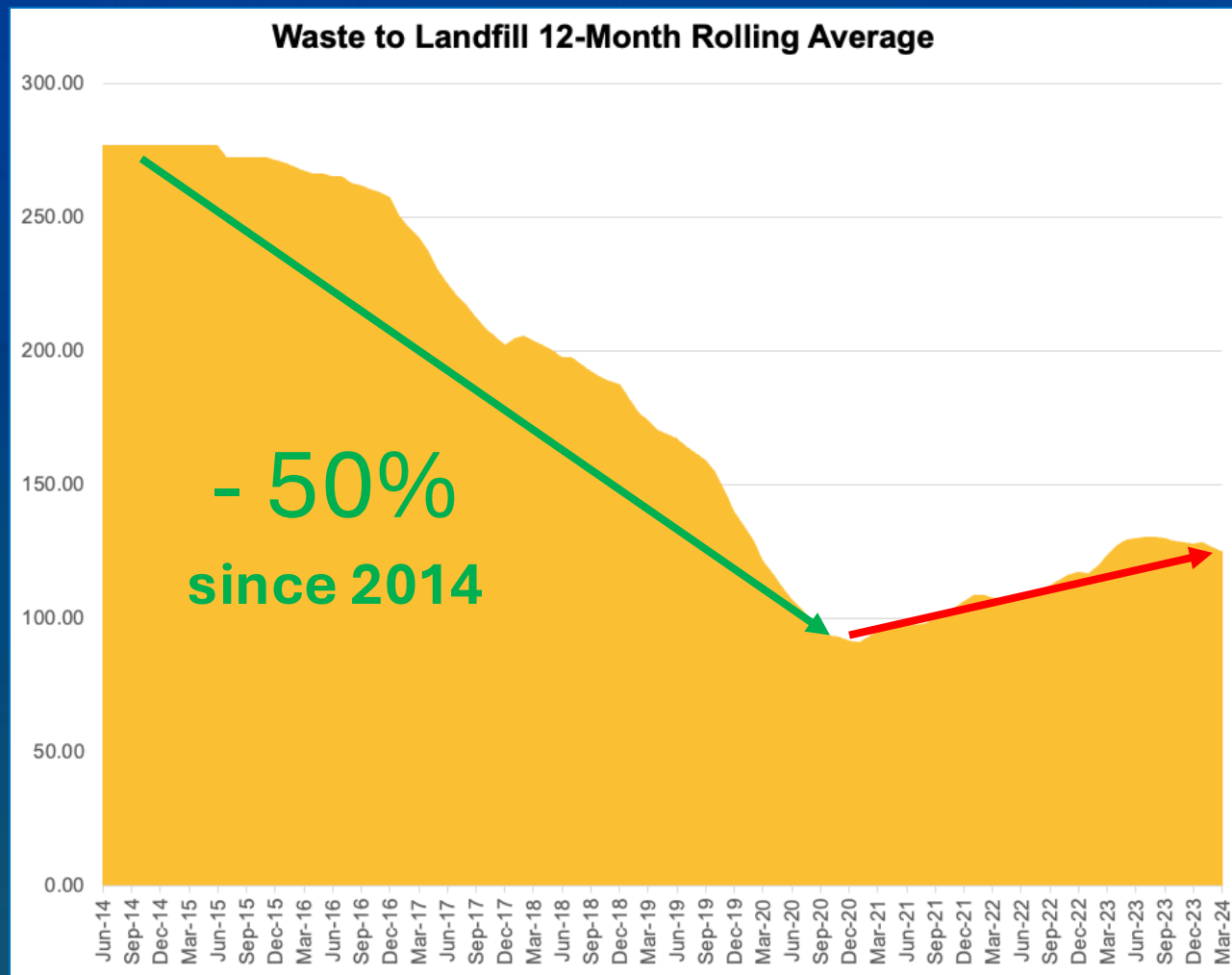
RENEWABLE ENERGY: NON-FIXED SOLAR PANELS



ENERGY EFFICIENCY: ACCURATE OCCUPANCY PREDICTION MODEL



WASTE MANAGEMENT CHALLENGE



Waste reduction has
bottomed out and
increasing from
historic low



FOOD WASTE: ENABLING PORTION CHOICES



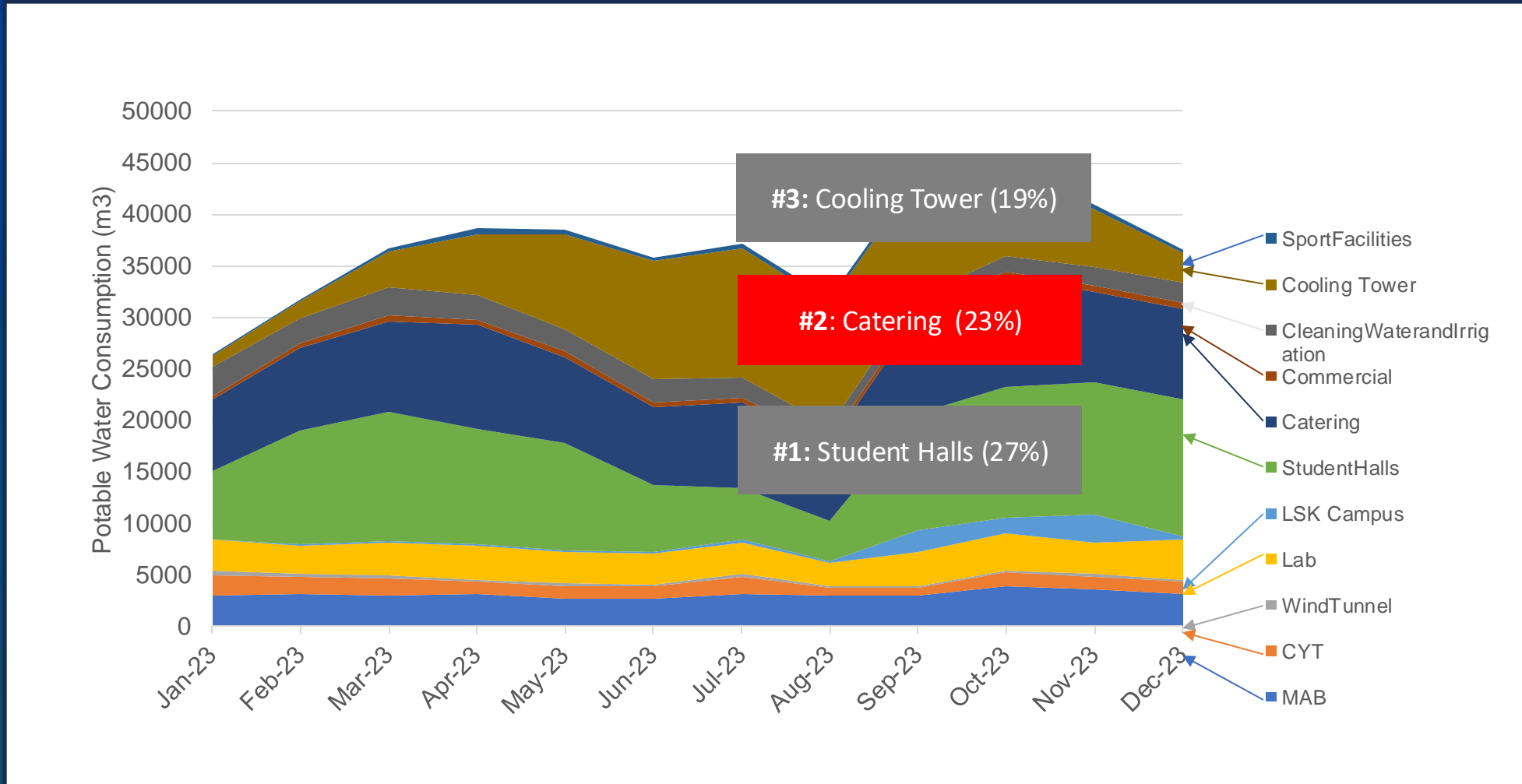
400 tons of food waste/year
= 1.5 million
bowls of rice



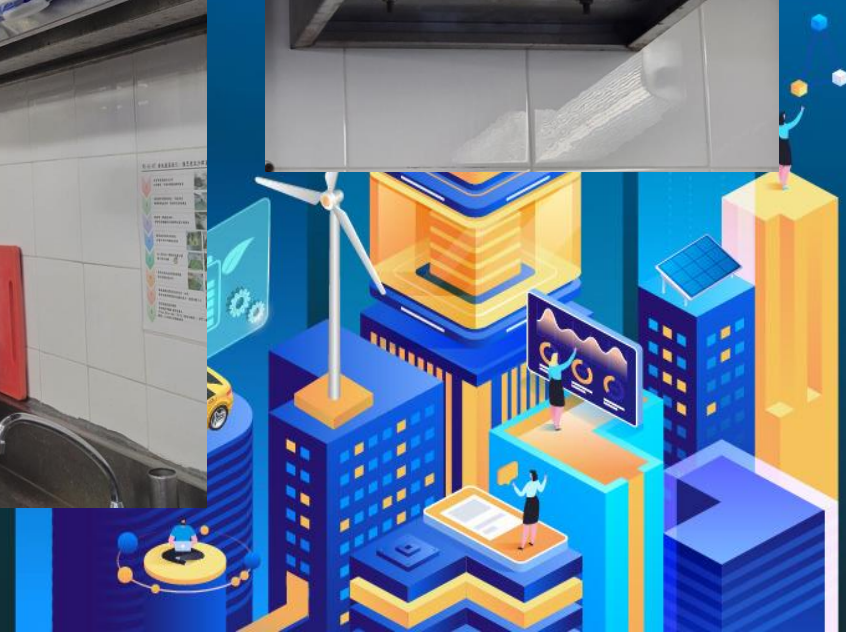
PLASTIC WASTE: REDUCING SINGLE USE PLASTIC + WAIT TIMES



WATER MANAGEMENT



THAWING TECHNOLOGY IN A SMALL OLD KITCHENS



WAYFINDING: REDUCE ANXIETY AND IMPROVE DISCOVERY

Path advisor Advanced Search Other Features Campus Map

Academic Building Campus Map CYT IAS LSK
Shaw Auditorium University Center

LG7, LG5, LG4, LG3, LG1, G, 1, 2, 3, 4, 5, 6, 7

Search

From

To The Hong Kong Jockey Club

+ Add destination

GO

Legends

- Accessible Toilet
- Guest Accommodation
- ATM
- Entrance / Exit
- Drinking Fountain
- Escalator
- EV Fast Charger
- Express Station
- Female Toilet
- KMB / Coin Exchange Kiosk
- Lift
- Live view video
- Mailbox
- Male Toilet
- Photo
- Restaurant
- Satellite Printer
- Staircase
- Taxi Stand
- Virtual Barn Workstation

You can report defects now!
Check [HERE](#) for details.



WELLNESS + SPACE EFFICIENCY: COMMON AREA OCCUPANCY



Warp Up & Timeline





8TH ROUND
SSC PROJECTS 2024

PROJECT PROPOSALS WELCOMED

Calling for **innovative solutions**
to be implemented on campus
as a **testing ground**.

01

OCTOBER 30, 2024
SSC Brainstorming
Workshop



03

JANUARY 13, 2025
Proposal
Submission
Deadline



02

NOVEMBER 22, 2024
Expression of
Interest Form
Deadline



FACULTY, STAFF AND
ALUMNI ARE
ALL WELCOME!

Click **HERE** to submit an initial Expression of Interest (EOI) form by 22 November 2024 to receive preliminary feedback on your Living Lab proposal idea from the SSC Committee.

