Sustainable Operations Progress Report, 2019-20

Prepared by the Sustainable Operations Executive Committee
Mark Hodgson, Chair
July 2020

Background

The Sustainable Operations Executive Committee (OpCo) was formed in 2016 as a strategy for addressing the aggressive performance targets adopted in the university's sustainability blueprint, called *the HKUST 2020 Sustainability Challenge*. Specifically, two targets created a direct challenge to the way the members of our community operate within the university, encouraging a collaborative effort across the campus to help meet the reduction goals.

Certainly, the Campus Management Office (CMO) and Campus Services Office (CSO) have oversized responsibilities for managing energy and wastes, but the reduction targets were designed to ensure that accountability is distributed across the campus and throughout our community. In order to achieve the goals, the OpCo relies on all campus stakeholders.

This report highlights the performance through 2019-20, and highlights some of the extraordinary roles people around the campus are performing to help meet the challenge.

The HKUST 2020 Challenge states that using 2014 as the baseline, we will accomplish the following performance targets by 2020:

1. Cut waste going to the landfill by 50%

2. Reduce our overall energy consumption and greenhouse gas emissions by 10%

Overall performance of key indicators

|	Baseline (2014-15)	Last Year (2018-19)	This Year (2019-20)	Change (Baseline)	Change (Last Year)
Electricity (kWh)	93,067,200	90,186,100	87,353,244	-6.10%	-3.10%
Trash (ton)	3,320	2,320	1,790	-46.1%	-22.8%
Recyclables (ton)	114	745	897	+687%	+20.4%
Food waste recycling (ton)	2.9	305	269	+9,176%	-11.8%
Greenhouse gas (ton CO2-e)	61,233	47,482	45,144	-26.3%	-4.9%
Water (m3)	406,158	395,899	352,444	-13.2%	-11.0%
Copy paper	39,320	34,040	24,141	-38.6%	-29.1%

Energy

Over 95% of the energy consumed on campus is in the form of electricity. Therefore, the OpCo determined that electricity should be the primary focus for reductions opportunities.

Over the past year the projects contributing to energy savings included the retro-commissioning of the virtual stack (exhaust) fans, which allowed the large motors to run at a lower and more efficient speed without compromising safety. A new ITSC Data Centre with a high-efficient design brought the PUE (power usage effectiveness) from over 2.2 to a best in class level of 1.6.LED lighting retrofits continued, along with new approaches in labs and ventilation strategies. As a harbinger of things to come, this year brought HKUST's first on-grid solar PV system on the rooftop of our Enterprise Center. In the meantime, the efforts to "smart" up our systems got a boost with the deployment of the first phase of new wireless meters for whole campus, which also helped create a heat map dashboard using IoT sensors for monitoring the energy performance and indoor air quality.

Electricity Consumption vs Baseline (Whole Campus)

12-month Rolling Average Electricity Consumption (kWh)

Baseline Consumption

Compare with baseline -6.1%

10% Saving Target
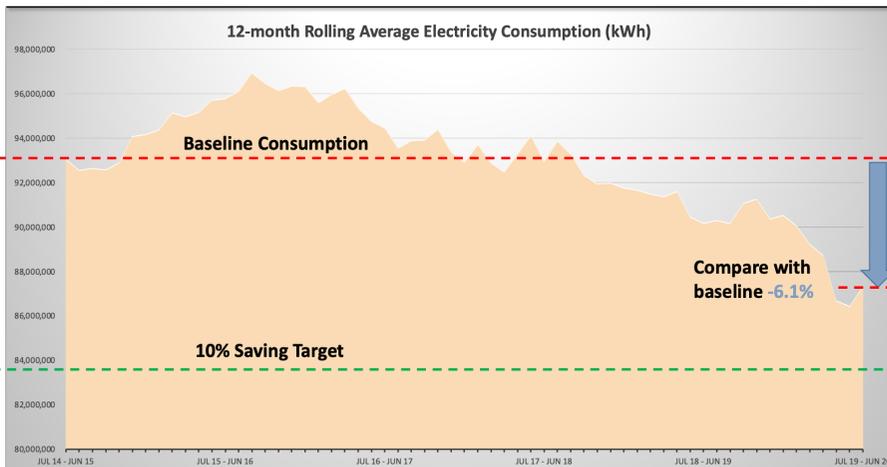
Efforts

In the year ahead we are excited to start the largest renewable energy project in Hong Kong – a massive solar energy project that will cover at least 45 buildings and generate enough renewable energy to completely offset over 20% of the total campus air conditioning needs. Sticking with the smart sustainable approaches to energy management, we will continue to add more sensors and sub-meters so that we have excellent real-time information within all buildings for advanced analytics and rapid response to issues as they arise. A new back-up cooling tower project is scheduled to be completed in the Fall, which will provide a much more efficient cooling system in the shoulder months. The combination of those, plus continued lighting projects, a, recommissioning of Building Automation Systems (BAS), along with a library smart lighting and fresh air demand control project will generate significant savings in the year ahead.

Comparison of Energy Drivers and Savers
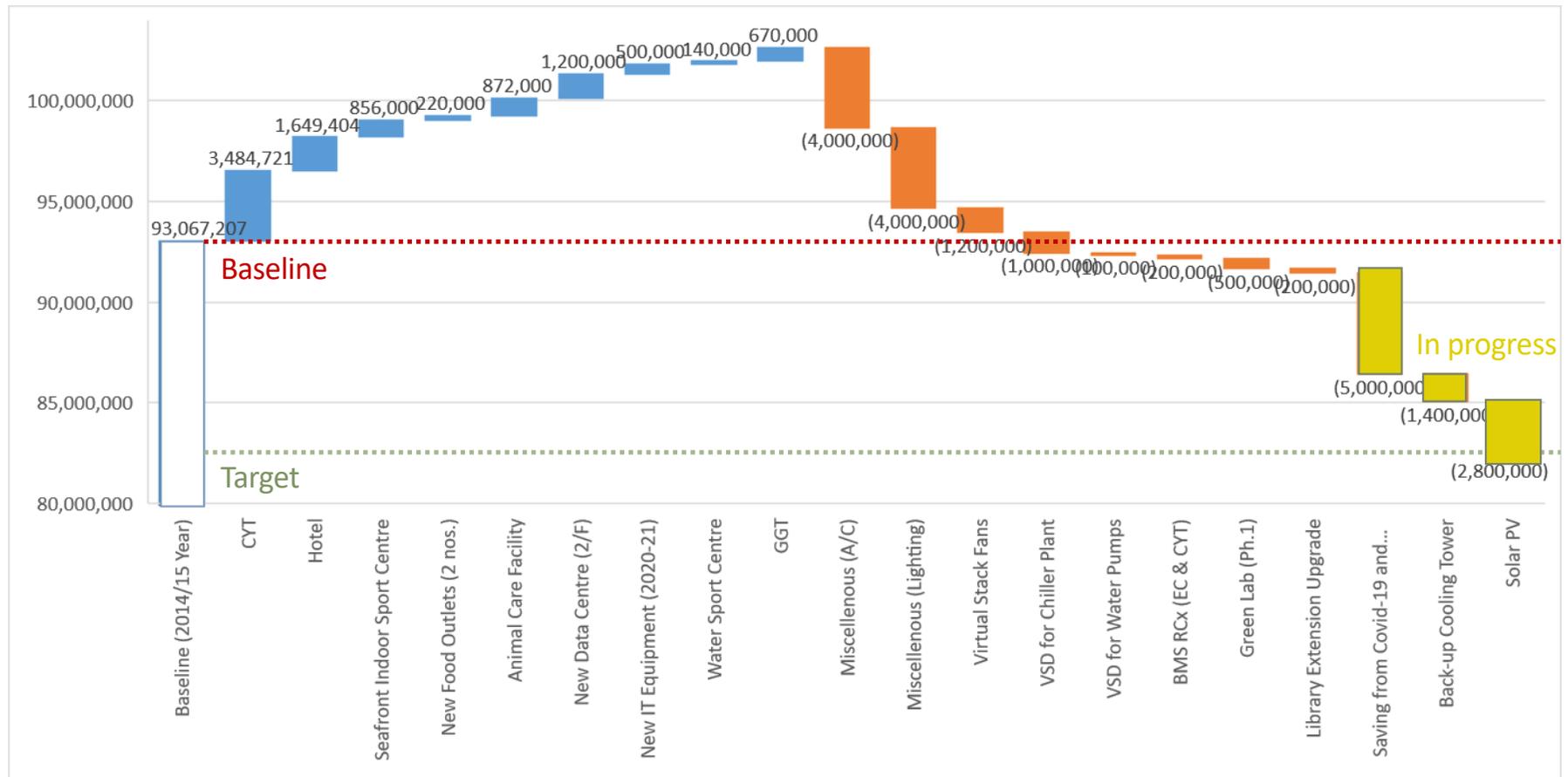
Metrics of Performance Since Baseline

ENERGY METRIC: CAPITA

Campus Population % Change Electrcity/Capita % change

ENERGY METRIC: SPACE (GFA)

Campus Area (GFA) % Change Electricity/GFA % Change
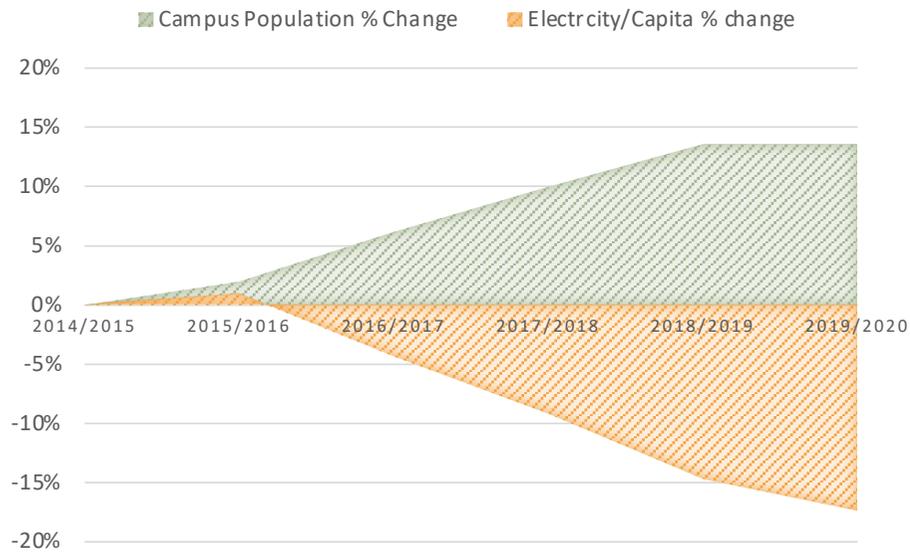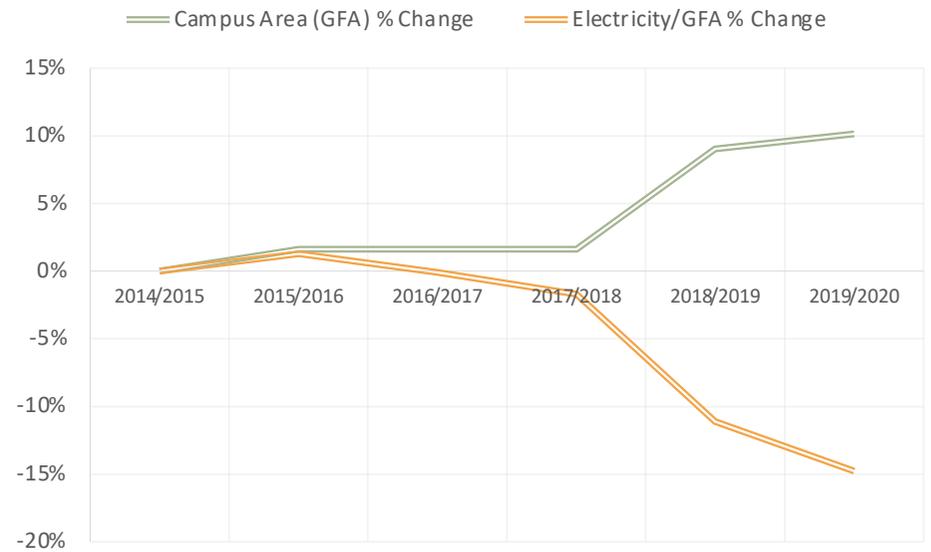
Waste

The past year saw several new initiatives to reduce the amount of waste going to the Hong Kong landfills. In order to enhance the accuracy of daily waste collection data and information, we implemented a new waste handling method in December 2019. Our waste handling center at LG7 was enhanced with a waste compactor and a RFID-integrated electronic scale. The weighing of individual collection bins from different locations throughout the entire campus can now be properly recorded, allowing for monitoring of waste disposal on a site-by-site basis across the University. Most importantly, we can strategically design and implement different waste collection and recycling plans base on accurate figures.

After the new system was fully in place, our cleaning contractor carried out a regular physical audit of waste bins from different locations to determine the composition of, and contamination rates within, general waste.

Waste Strategies in the New Year

To achieve "Dump Less, save More" in our campus, we will tailor make a platform to manage waste and recyclable information by connecting our people to smart scales and mobile devices. In the first phase of the project, we have introduced a smart scale to collect the waste data. In the second phase, we will roll out the pilot scheme with 20-40 departments to identify their waste by using QR codes on the trash bags. This will allow us to collect real time waste data at source and identify problem areas immediately. This will lead to a more comprehensive facilitation of waste policies and related action plans.

Apart from the smart waste collection project, we were exploring to convert the waste hand paper towel to useable compost. We generate a significant amount of hand towel waste daily, if we can successful startup this project, obviously, it can greatly ease the pressure to landfill due to the use of hand paper towel. Whilst, we can explore the project of behavior change that remind the users to take less from the point of use.

Waste and Recycling Performance

Waste

The year ended with waste to the landfill 46% below the baseline level.

12-Month Rolling Average Of Waste Generation
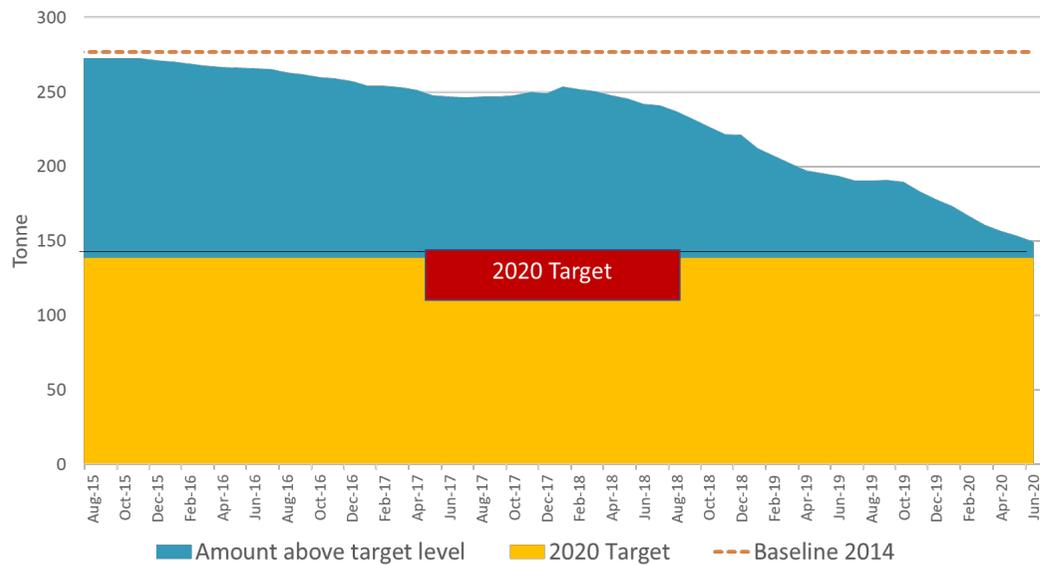
Recycling

Recycling amount in July to June 2020 is 20% higher compared with same months in 2018-2019. Compared to the baseline, recycling has increased 686%.

2019-20 Recycling Amount (Cumulative Sum)
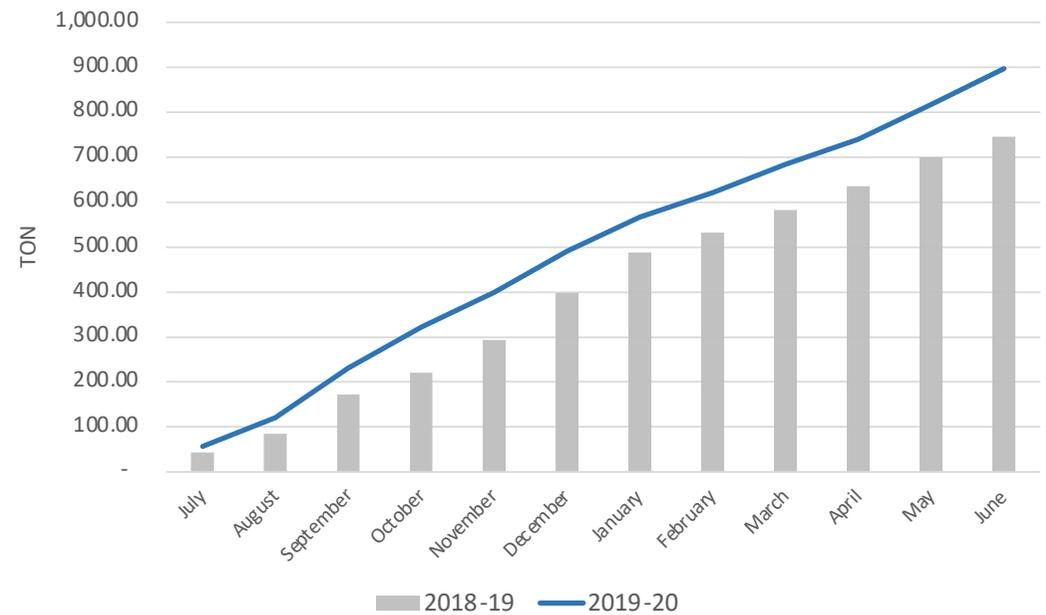
Looking to the Future

The HKUST Sustainability 2020 Challenge will come to an end this year and we will have a chance to see how well we performed against our energy and waste targets. The goals of the plan were ambitious, but there was consensus that ambitious targets lead to people thinking more creatively by challenging previous assumptions and testing new ideas and approaches. The Challenge accomplished this goal, and more.

We were also fortunate that the Challenge was accompanied by the Sustainable Smart Campus as a Living Lab initiative (SSC) where researchers and students were encouraged to find new and exciting projects to implement on campus. Only a few projects were energy or waste-related, but the rise in interest and excitement of creating a smarter and more sustainable campus helped stimulate conversations created the conditions for more creative problem solving. The energy dashboards, heat maps, and smart trash analytics were beneficiaries of taking of this new attitude.
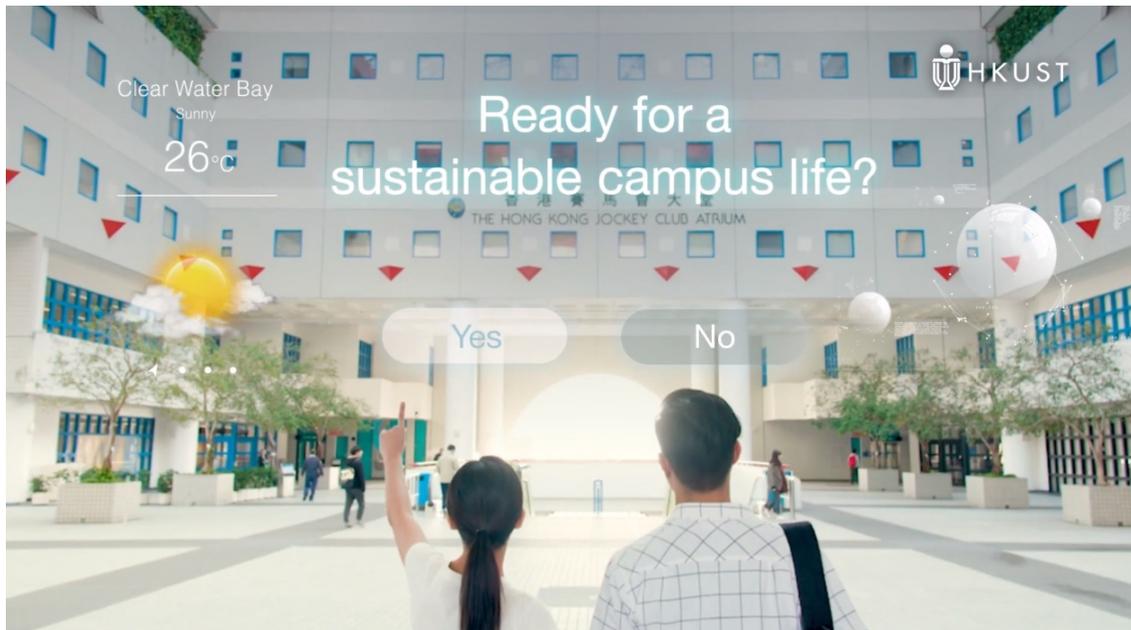
HKUST 2026
Sustainability
Challenge

Next Strategic Plan

Throughout 2020 we will be developing the next phase of our sustainability journey, with the development of a new set of goals and targets. In addition to the energy, GHG, and waste, we will include new categories in Landscape & Biodiversity, Water, and Healthy Food Systems.

The new strategic plan will be based on the Six Year Plan of the university and will be fully integrated and embedded within the fabric of the university's priorities.

Similar to the 2020 Challenge, the new plan will also have core elements in Education, Demonstration, and building the Community Network, in addition to the operational performance core. The biggest difference is that the new plan will also include the objective of integrating the approaches we have developed on the Clear Water Bay campus into the new campus in Guangzhou.

Progress & Performance
2026 Goals

Energy and GHG

Landscape and Biodiversity

Water

Healthy Food Systems

Waste to the Landfill
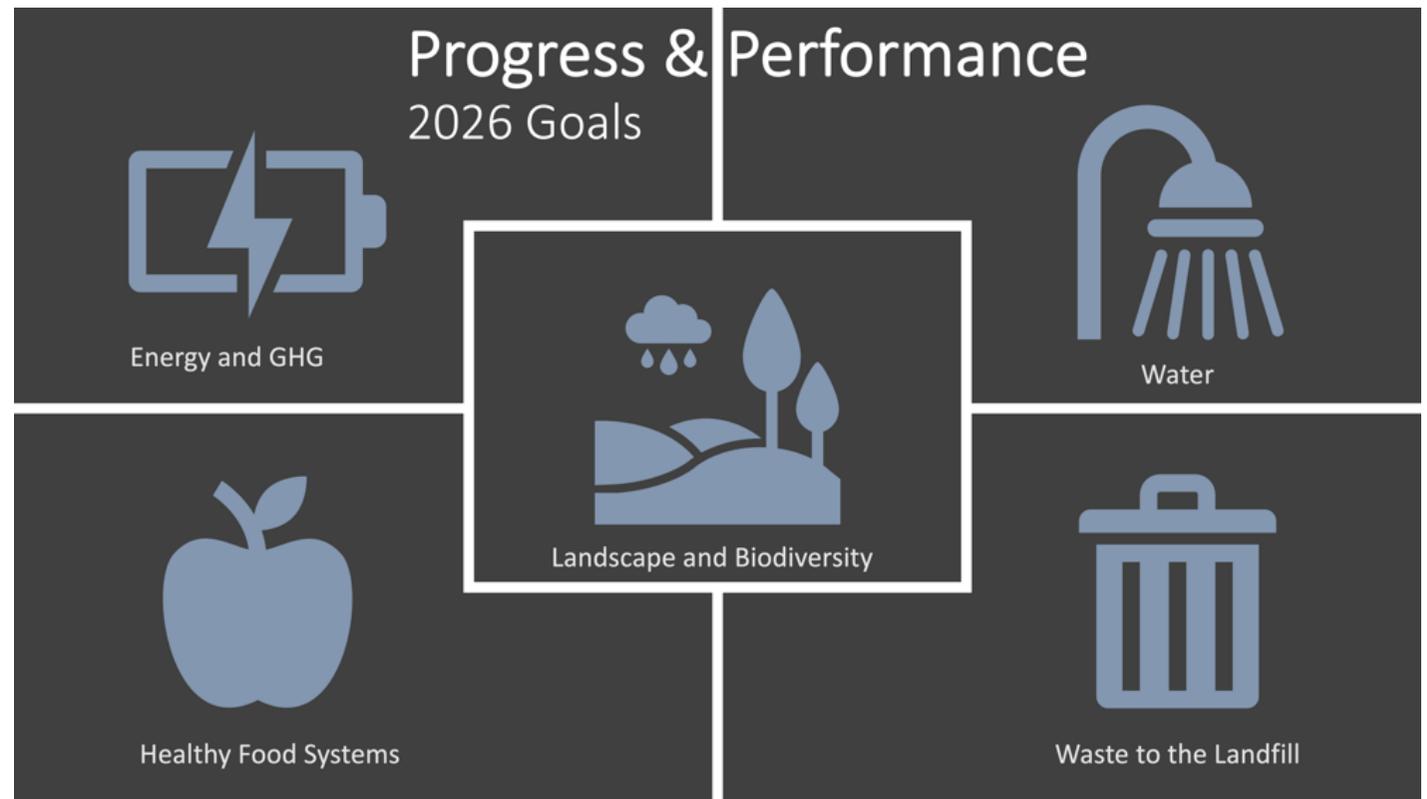
Continued Testing and Exploration

In the past years some of the most important strategies for improving our sustainability performance came from testing, piloting, and being continuously curious. There is no limit to innovation, so there should be no limit to using our campus to try new approaches that will help us utilize our precious resources more responsibly.

Engagement – The Key to Success

The success of the 2020 Challenge is not due to the corporation and coordination of hundreds of people –students, staff, and faculty – on the campus who were dedicated to transforming HKUST into a modern, accountable, and environmentally responsible institution ready to tackle the most serious challenge of the 21st century. One of the highest priorities for the next strategic plan is to continue with staff building workshops, engagement efforts, and providing opportunities for all members of our HKUST community to participate.

2019-20 Members of the Sustainable Operations Executive Committee

Mark Hodgson	VPAB, *Chair*
Davis Bookhart	Sustainability, *Secretary*
Diana Chan	Library
Wilson Chan	CMO
Michael Cheng	PURO
Alex Cheung	CMO
Theresa Lo	ITSC
Loretta Luk	Sustainability
Alan Ng	PURO
Stella Ng	HRO
Thomas Ng	MTPC
Derek Sit	CSO
Edward Spodick	Library
Carmen Sun	Sustainability
Alice Wong	FO
Johnny Woo	ISO
Samuel Yu	HSEO