Environmental Report 2016-17

CityU
香港城市大學
City University of Hong Kong
專業 創新 胸懷全球
Professional·Creative
For The World

Toward a Sustainable Campus

Table of Contents

Message from Director

The University is committed to conserving the environment through appropriate means. We promote an environmentally responsible attitude among our members in the efficient use of resources, waste minimization and pollution prevention in the course of our work.

The Environmental Report for 2016 – 2017 covers the period from 1 July 2016 to 30 June 2017. During that period, over 141 tonnes of solid wastes and 250 tonnes of food waste were recycled. In addition, the energy consumption has decreased by 1.5 million kWh.

Several new initiatives were implemented. The Municipal Solid Waste (MSW) Trial generated encouraging results in that, after interventions, the recyclables being disposed of in waste bins reduced significantly by about 14%.

Campus greening not only improves the aesthetics but also supports biodiversity. Over 60 different kinds of colourful shrubs grow in our gardens, each with its own individual scent and each in tune with its own season. In November 2016, the Brazil bougainvillea, a flower that is tough, highly resilient, and blossoms throughout the year, was selected as the official flower of the University.

This report shows the continual efforts done by our team members in every aspect for environmental sustainability. We hope that you would enjoy reading it.

Brenda Lai
Director of Facilities Management

2016 – 2017 Environmental Performance

Waste Recycling

- Diverted over 141 tonnes of solid wastes from landfills.
- Recycled over 250 tonnes of food waste.
- Achieved saving of over HK$0.1 million through renew / repair of equipment and salvage of building materials.

Energy Conservation

- Cut electrical energy consumption by 1.5 million kWh or 2.5% reduction.

Water Conservation

- 3,417 m^3 of grey water recycled for irrigation, which represents 40% of total water consumption for irrigation from water basin and condensate water from air-conditioning on the campus for irrigation.

Contribution to Teaching

- Conducted more than 9 green talks and green campus tours for over 320 students.

Awards

- For the 15th consecutive year, awarded the "Excellence Level" Wastewi$e Certificate by the Environmental Campaign Committee of the HKSAR Government.
- Won the Waste Check Commitment Award and Waste Check Promotional Partner Award by the Environmental Protection Department of the HKSAR Government.

1. Waste Management

1.1 Municipal Solid Waste (MSW)

After an extensive public consultation and public engagement on the implementation framework of the municipal solid waste (MSW) charging scheme in 2012, the HKSAR affirmed the introduction of quantity-based MSW charging in Hong Kong based on the fact that quantity based charging can create financial incentive to drive behavioural changes in waste generation thus reducing the overall amount of waste required for disposal.

Facilities Management Office (FMO) conducted a CityU MSW Trial, aiming to reduce waste by introducing waste audit and interventions, at the University Concourse, common area of Floor 3 (outside library) of YEUNG and 3M footbridge for the period from 1 January to 30 June 2017.

The baseline waste profiles of selected sites were obtained, different interventions were applied to find out the most effective ways of waste reduction and to promote waste separation and recycling.

Intervention 1: Relocation of waste bins by relocating existing waste bins to each location where there is recycle bins. The location of other green bins remain unchanged.



Intervention 2: Road signs on waste bins to remind to put recyclable waste to recycle bins and tell the nearest location of recycle bins. Posters containing information on waste problem or waste recycling to raise the awareness of waste reduction.



Intervention 3: Reduced no. of waste bins by putting waste bins only besides recycle bins and taking away all other waste bins from common area.

Result of waste audit – from waste bins:

Item	Baseline Waste		Result of Intervention 1		Result of Intervention 2		Result of Intervention 3	
	kg	%	kg	%	kg	%	kg	%
Paper	79.7	8.17	62.6	7.75	91	9.45	27.2	2.82
Plastics	86.6	8.87	61.1	7.57	70.6	7.33	41.4	4.30
Metals	51.3	5.26	26.6	3.29	32.6	3.39	17.5	1.82
Glass bottles	7.4	0.76	5.6	0.69	6.5	0.67	1.2	0.12
Total recyclables	225	23.06	156	19.32	201	20.84	87.3	9.07
Municipal solid waste	750.9	76.94	651.6	80.68	762	79.16	875.7	90.93
Total waste	975.9		807.6		963		963	

Interpretation:

(1) Total recyclables being disposed of in waste bins were reduced by 3.74% after intervention 1.
(2) The recyclables being disposed of in waste bins after intervention 2 were similar to that of intervention 1.
(3) The recyclables being disposed of in waste bins reduced significantly by about 14%.

Result of waste audit – from recycle bins:

Item	Result of Intervention 2			Result of Intervention 3		
	From Waste Bins		From Recycle Bins	From Waste Bins		From Recycle Bins
	kg	%	Kg	kg	%	kg
Paper	91	9.45	92.6	27.2	2.82	166.4
Plastics	70.6	7.33	53.1	41.4	4.30	53.5
Metals	32.6	3.39	23.1	17.5	1.82	33.1
Glass bottles	6.5	0.67		1.2	0.12	
Total recyclables	201	20.84	168.8	87.3	9.07	242
Municipal solid waste	762	79.16		875.7	90.93	
Total waste	963			963		

Interpretation:

The amount of recyclables collected increased significantly after intervention 3 by 43.36%.

1.2 Solid Waste

In order to reduce the burden on landfill, a lot of effort has been put into the 5 “R” strategy of reduce, rethink, reuse, restore and recycle which is evident in the following:

(a) Reuse and Restore

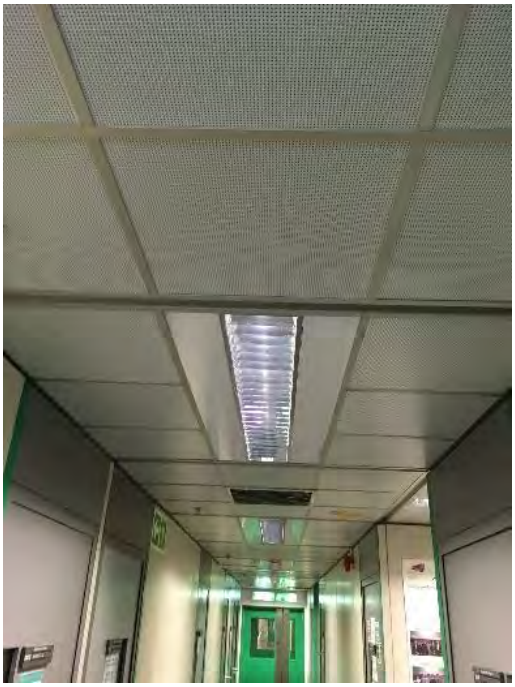
- **Used Furniture**

The ironmongeries such as door closers and door locks in good condition were collected during the renovation works at purple zone of 7/F Yeung Kin Man Academic Building (YEUNG), properly stored and prepared for the replacement of defective parts in various campus buildings. About 20 sets of door locks were reused at office areas of Yeung Kin Man Academic Building.

100 pieces of used grey carpet tiles in good condition were collected from the renovation works at purple zone of 7/F YEUNG to replace the stained or dirt carpet tiles at common corridors and office areas of YEUNG.

About 30 m of suspended ceiling grid were collected during the renovation works at 7/F YEUNG, properly stored for the repair works on campus.

The rockwool false ceiling tiles dismantled from the renovation works at 10/F Lau Ming Wai Academic Building (LAU) were collected. About 30 pieces of false ceiling panels in good condition were reused to replace the defective or stained ceiling tiles at the corridor of 5/F and 6/F of LAU.

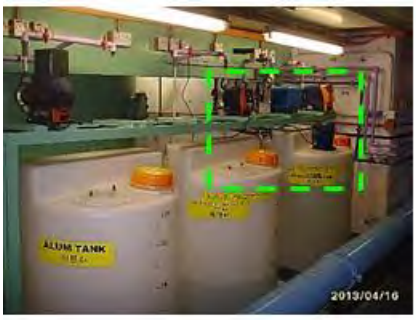


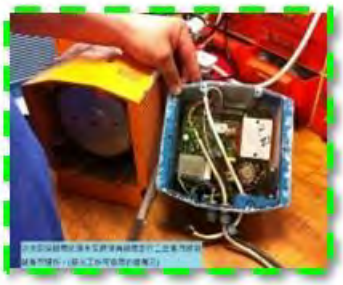
Fibre glass false ceiling panels are good sound insulators, yet they are fragile and easily discoloured. Approximately 600 m^2 of these fibre glass panels have been dismantled, collected and reused – they are now placed above the metal sheet panels to strengthen the false ceiling system in the common corridors on 6/F and 7/F of YEUNG.

- **Salvaged Building Materials**

  In 2016/17, 15 items weighing a total of 149 Kg of materials have been repaired, re-used, and re-cycled, which contributed a saving of $88,000. The major jobs done include:

  - useful parts of two defective chemical water pumps were re-assembled / re-conditioned to form a functional pump set;
  - abandoned air pump parts were re-used to repair damaged pumps;
  - ball float valves of 100 mm (dia) were dismantled to collect useful parts as spare;
  - discarded air filters of good conditions were collected as spare.





(b) Recycle

- **Summary of Solid Wastes Diverted from Landfills:**

	Year 2015 – 16	Year 2016 - 17
Waste paper recycled (kg)	178,722	110,156
Aluminum cans recycled (kg)	815	464
Plastic bottles recycled (kg)	1,591	1,264
Printer cartridges recycled (kg)	1,055	618
Compact discs recycled (kg)	13.7	41
Mercury-containing fluorescent tubes and lamps recycled (kg)	20,600	18,000
Green waste and plant trimmings reused (kg)	195	180
Glass bottles recycled (kg)	9,474	9,877
Rechargeable batteries recycled (kg)	337	0
Used Lai See packets (kg)	100	100

- **Recycling of Food Waste by Caterers**

The University always makes use of each opportunity in applying green measures on campus, including the requirements of sorting, collection and recycling of food waste in the catering services contract.

All caterers on campus collect food waste generated from their respective catering outlets and recycle it into fish / animal feed or fertilizer according to requirements laid down in their catering services contracts. FMO continues to play the role of monitoring. FMO inspects catering outlets on a regular basis to check that proper separation, collection and recycling are carried out. Also, site inspections were conducted to the manufacture sites of the food waste collection contractors to check that food waste collected from CityU is actually processed and recycled into fish / animal feed or fertilizer.

Summary of Food Waste Recycled:

	Year 2015 – 16	Year 2016 – 17
Food waste collected and recycled for making fish / animal feed or fertilizer (kg)	244,507	250,155

1.3 Collection and Treatment of Hazardous Wastes

Hazardous waste disposal and treatment are carried out in strict accordance with relevant statutory regulations and requirements in order to prevent contamination of the environment and safeguard health and safety of the University community.

Chemical Waste and Clinical Waste Stores

Radioactive Waste Store

Hazardous wastes responsibly disposed of in Year 2015 – 16 and Year 2016 – 17 are listed in the table below :

	Year 2015 – 16	Year 2016 – 17
Liquid Chemical Waste # (L)	16,045.5	22,200
Solid Chemical Waste # (kg)	21,000	31,690
Clinical Waste * (kg)	2,338	3,751
Liquid Radioactive Waste (L)	45.5	12.5
Solid Radioactive Waste (kg)	12	8.5

Remark: # *As defined under the Waste Disposal Ordinance (Cap. 354). These wastes include fluorescent tubes, lamps, batteries, oily rags, paint pails, etc.*

* *Mainly blood contaminated waste from Young Chung-Yee Health Centre of the University and dead animals from laboratories.*

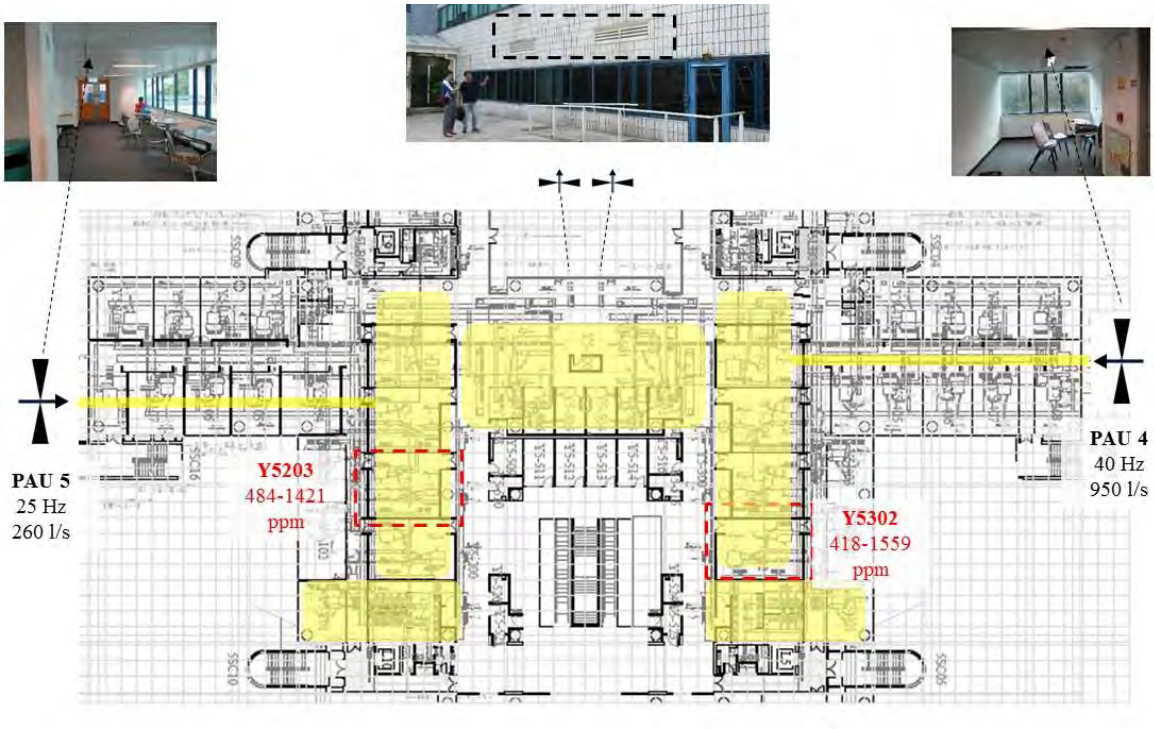
2. Air Quality Management

The University is committed to maintaining good indoor air quality (IAQ) to provide a pleasant studying and working environment. The ventilation systems of all academic and administrative buildings are properly maintained to ensure its effectiveness.

Regular university-wide IAQ monitoring for the University buildings are carried out to assess IAQ conditions and help to identify any potential problems. The results indicate that the IAQ of CityU offices and buildings is mainly classified as “Good” and “Excellent” level according to the “Guidance Notes for the Management of IAQ in Offices and Public Places”.

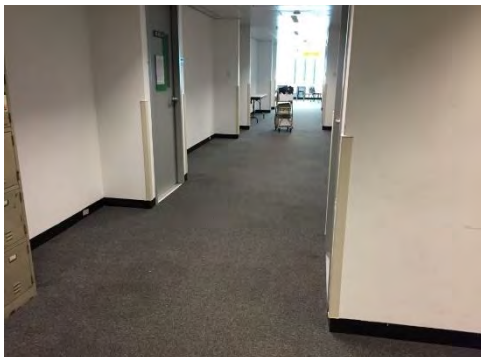
In 2016/17, over 6,000 air-conditioning units installed in different campus premises were inspected and serviced; and over 22,000 air filters were cleaned.

IAQ investigations and calibrations of air-conditioning equipment are carried out as and when required. In 2016/17, one of the major accomplishments is to conduct a fleet check and adjust fresh air supply for 5/F classrooms at YEUNG during the summer term break.



In response to the request for improving smelly toilets, to resolve the problem, a market survey has been conducted and two nano confined catalytic oxidizer (NCCO) "smell absorbers" have been installed at the 5/F male toilet of YEUNG as a trial.

Low volatile organic compound emission carpet tiles with using recycled PVC and glass fiber were used.



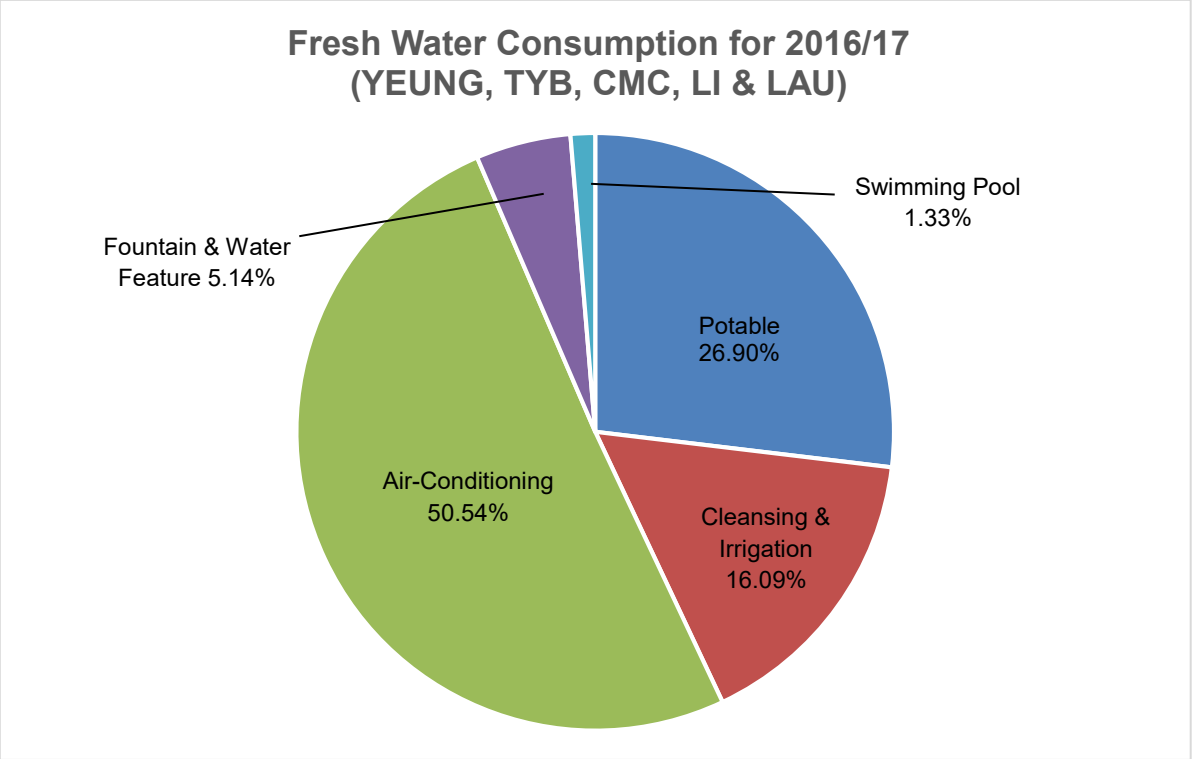
3. Water Conservation, Consumption and Management

In 2016/7, the University has consumed 2.62% less water. Nearly half (at 50.54%) of the water consumption was still for water cooled chillers for air-conditioning. Despite the quantities increased by 7.65%, the percentage of the overall consumption decreased by 2.62%. It is due to the fact that the consumption of cleansing and irrigation decreased by 25.5% whilst 4.10% for that of potable water. The sequence of the water consumption other than cooling of air-conditioning in descending order is potable water, cleansing, irrigation, fountains, water features and swimming pool.

3.1 Water Consumption and Management

The fresh water consumption on campus for various purposes in year 2016/17 is depicted in the following table and pie chart.

		2015/16		2016/7	
		m^3 (x 1000)	%	m^3 (x 1000)	%
1	Potable Water				
	Amenities Building & Hu Fa Kuang Sports Centre	16.72	7.51	5.36	2.47
	Yeung Kin Man Academic Building & Administration Buildings	41.13	18.46	48.08	22.16
	To Yuen Building	0.54	0.24	0.56	0.26
	Run Run Shaw Creative media Centre	0.93	0.42	0.95	0.44
	Li Dak Sum Yip Yio Chin Academic Building	1.69	0.76	1.88	0.87
	Lau Ming Wai Academic Building	1.47	0.66	1.53	0.71
	Subtotal	**62.48**	**28.05**	**58.36**	**26.90**
2	Cleansing & Irrigation				
	Amenities Building & Sports Centre	11.25	5.05	9.63	4.44
	Yeung Kin Man Academic Building & Administration Buildings	16.63	7.46	15.12	6.97
	To Yuen Building	0.13	0.06	0.12	0.06
	Run Run Shaw Creative media Centre	1.53	0.69	3.67	1.69
	Li Dak Sum Yip Yio Chin Academic Building	0.63	0.28	1.20	0.55
	Lau Ming Wai Academic Building	16.69	7.49	5.17	2.38
	Subtotal	**46.86**	**21.03**	**34.91**	**16.09**
3	Air-conditioning				
	Yeung Kin Man Academic Building	72.98	32.76	82.53	38.04
	Li Dak Sum Yip Yio Chin Academic Building	14.2	6.37	13.27	6.12
	Lau Ming Wai Academic Building	14.67	6.58	13.84	6.38
	Subtotal	**101.85**	**45.72**	**109.64**	**50.54**
4	Fountain & Water Feature	9.05	4.06	11.16	5.14
5	Swimming Pool	2.54	1.14	2.88	1.33
Yearly Total (x 1000m^3)			**222.78**		**216.95**
Consumption / month (x 1000m^3)			**18.57**		**18.08**



3.2 Water Usage Performance

Compared with that of year 2015/16, the annual fresh water consumption in year 2016/17 decreased by 2.62% and the following particulars were observed:

(a) Potable water consumption decreased by 6.59%.

(b) The cleansing and irrigation water consumption decreased by 25.50%. One of the reasons may be due to decrease in total rain fall (1875.5mm in 2015 while 3026.8mm in 2016).

(c) The water consumption for the evaporative cooling tower of air-conditioning plant increased by 7.65% because some air cooled chillers have been converted to water cooled chillers and more campus space has been created.

(d) The water consumption of fountain & water features increased by 23.31%.

(e) The water consumption due to water replenishment for swimming pool decreased by 13.39% due to closure of swimming pool in the period of the year.

3.3 Use of Waterless Urinal System

There were more than 150 urinals adopting 'Desert Cube Waterless Urinal System' in male toilets on campus for To Yuen Building and some small usage male toilets. The total saving of flushing water was over 7,776 m^3 representing an annual reduction in carbon emission of about 1.34 tonnes CO_2-e.

3.4 Potable Water Saving Measures

The existing 300 water saving aerators installed for washbasin taps in toilets on the campus provided an annual saving of about 9,720 m^3 of potable water was achieved which is equivalent to an annual reduction in carbon emission of about 4.2 tonnes CO_2-e.

Before

After

3.5 Recycling of Grey Water

During the year 2016/17, 3,417 m^3 of grey water has been recycled, which represents 10% of the total consumption for irrigation from water basin and condensate water from air-conditioning on the campus for irrigation. Furthermore, 2,562 m^3 of rain water has been collected from the rain harvest tank and 14 m^3 of underground water for irrigation.

An annual saving of the total volume of potable water is equivalent to an annual reduction in carbon emission of about 2.83 tonnes this CO_2-e.

3.6 Reuse of Spent Swimming Pool Water

After closure of the Swimming Pool, spent pool water of approximately 1,800 m^3 was redirected using pumps and pipes (Photo 1) to Nam Shan Chuen Refuse Chamber (Photo 2) for cleansing purpose and to the flushing water sump tank (Photo 3) for toilet flushing purpose.

Photo 1

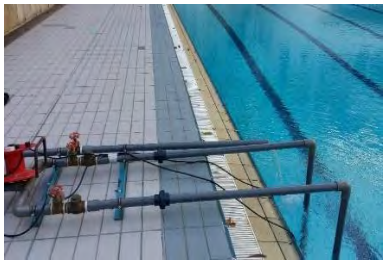


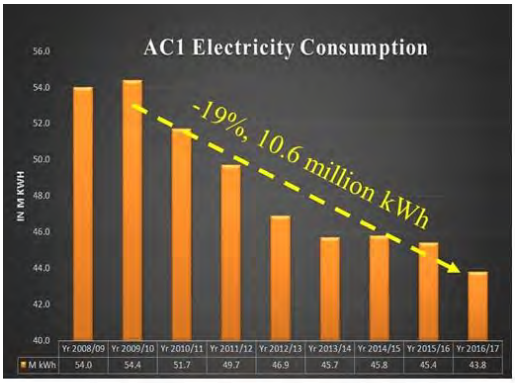
Photo 2

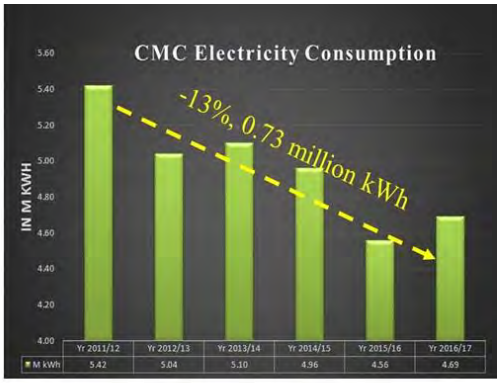
Photo 3

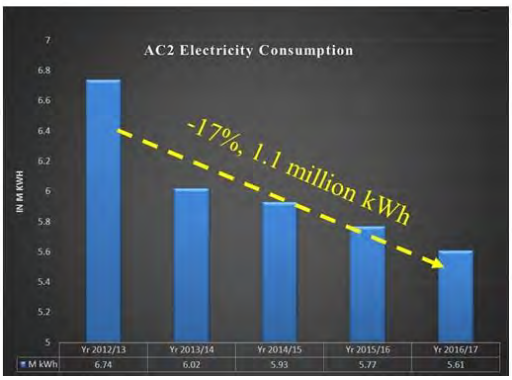
4. Energy Conservation

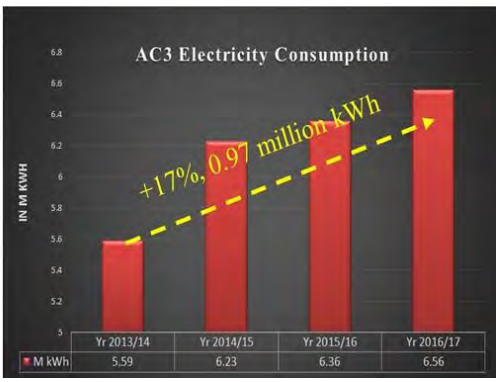
4.1 Annual Performance

Reduction on energy wastage and maximization on efficient use of electricity are achieved by exercising tight monitoring and control with regular reviews on energy utilization.









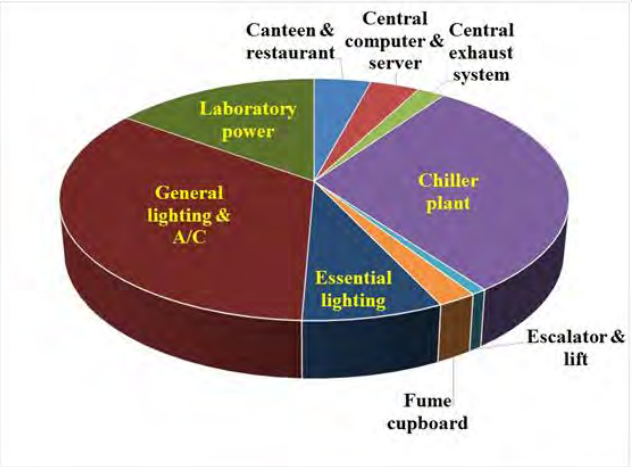
The total annual electricity consumption for 2016/17 is 60.6 million kWh, saving 1.5 million kWh or 2.5%. The composition of electricity consumption is tabulated below.

Bldg.	**2015/16 (mil kWh)**	2016/17 (mil kWh)	Saving (mil kWh)	Saving (%)
YEUNG	**45.4**	43.7	1.7	3.8
LI	**5.8**	5.6	0.15	2.6
LAU	**6.4**	6.6	-0.19	-3.1
CMC	**4.6**	4.7	-0.13	-2.9
Total	**62.1**	**60.6**	**1.5**	**2.5**

Bldg.	Mil kWh	GFA (000' m^2)	kWh/m^2
YEUNG	43.7	159.3	274
LI	5.6	40.0	140
LAU	6.6	42.1	157
CMC	4.7	23.6	199
Total	**60.6**	**265.0**	**229**

The distribution of energy utilization in YEUNG is :

- General lighting & A/C, 34%;
- Chiller plant, 30%;
- Laboratory power, 15%;
- Essential lighting, 8%;
- Central computer & server, 4%;
- Canteen & restaurant, 4%;
- Fume cupboard, 2%;
- Central exhaust system, 2%;
- Escalator & lift, 1%



4.2 Energy Saving Initiatives

In 2016/17, 34 improvement works (involving 507 equipment items) have been implemented to save energy. The annual energy saving was 0.42 million kWh. Details are listed in the table below. Over 75% of the total energy saved was contributed by de-lamping, switching off unnecessary air-conditioning and reducing operating time of equipment.

*Improvement Actions	Quantity	Saving (1000 kWh)	%
Retrofit LED lamps	182	59	14
De-lamps and switch off air-conditioners	289	190	45
Reduce operating time of equipment	14	129	31
Increase operating temperature	0	0	0
Combined operation of fan & air-conditioning units	22	43	10
Maximize chiller efficiency	0	0	0
Total	**507**	**421**	**100**

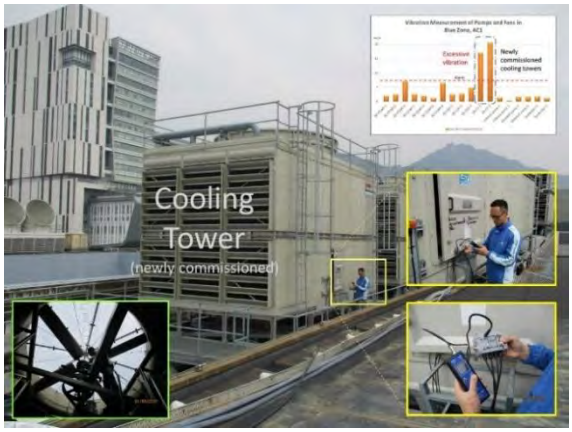
The major accomplishments of energy saving initiatives are :

- Replace down lights (36W, 110 nos.) by 20W LED lamps under the podium at LAU;
- Replace 250W high bay sodium lamps (40 nos.) by 80W LED lamps at NSC entrance;
- Install 35 ventilation fans to reduce use of air-conditioning units;
- Reduce running hours of nine primary air units, from 9/F to 19/F, LAU.

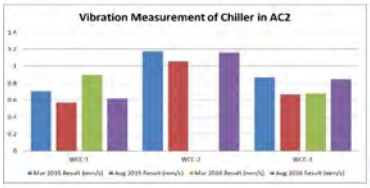
4.3 Condition-based Maintenance

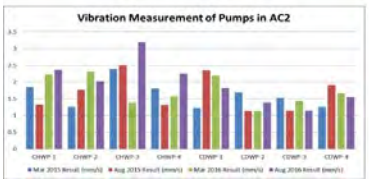
By means of microscope, vibration analyzer, and thermal scanner, 350 condition-based maintenance tasks have been conducted by assessing :

- Contamination level of chiller compressor oil;
- Mechanical vibration level of chiller compressors, pumps, ventilation fans;
- Surface temperature of cable terminations, busways;
- Room temperature and humidity of laboratories.



In so doing, the state of health of equipment in operation could be closely monitored and controlled. The repair and maintenance costs due to unplanned outage and scheduled replacement of chiller compressor oil and fan bearings are reduced substantially (>$0.7 mil/yr).

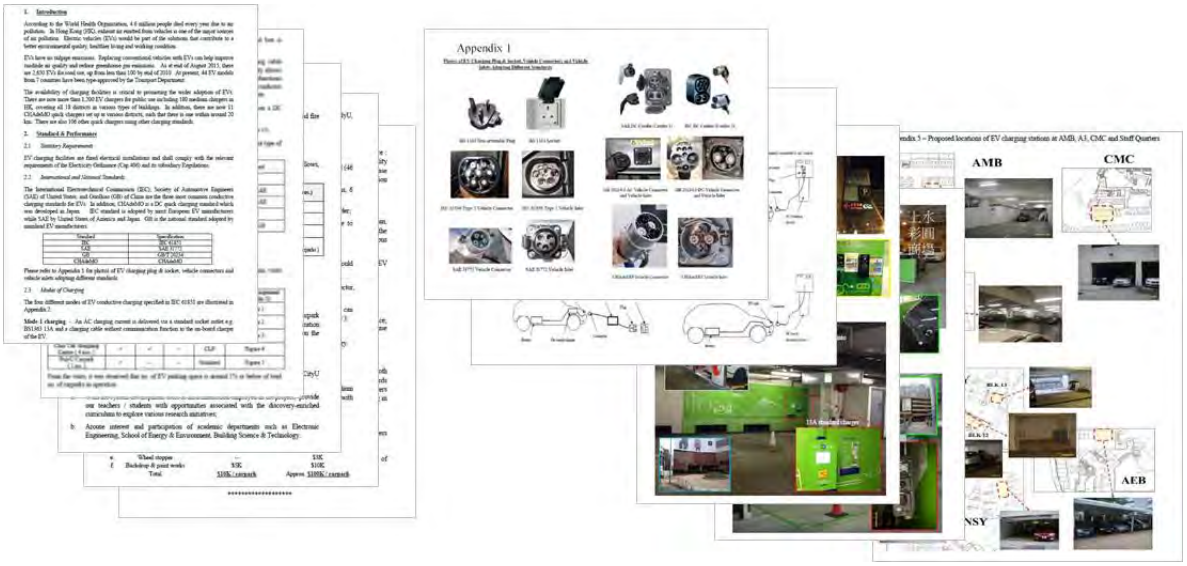


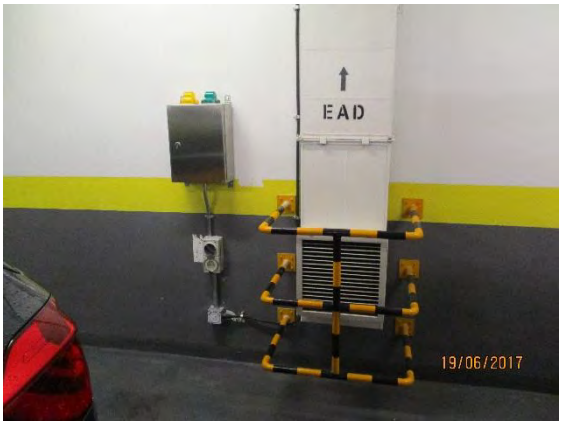


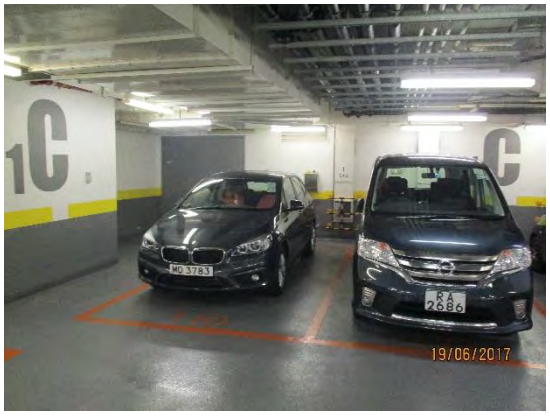
4.4 Electric Vehicle (EV) Charger

To contribute to reducing emissions of nitrogen oxides, respirable suspended particulates, volatile organic compounds,…etc from road transport, a technical study has been conducted in conjunction with HKPC, EE department, CLP and service providers. The purpose of study is to explore the technical feasibility of installing EV chargers (standard 13A / medium 32A / quick 63A) in the CityU campus.

As the EV technology is growing and changing rapidly and the demand of EV charging station is under review, standard 13A chargers have been installed at TYB, BOC and LAU carparks for trial purpose. (Note : The 13A charger is designed & built by in-house team).







5. Campus Greening

FMO realizes the value of greening and always tries every effort in improving and maintaining a green environment for the enjoyment of the University students, faculty, staff and visitors by carrying out regular maintenance and improvement work.

5.1 University Official Flower

A University Flower Selection Steering Committee and University Selection Panel was set up for selecting a suitable flower to represent CityU. The panel consisted of representatives from staff, students, alumni, internal and external advisers as well as a member of the FMO Landscaping Team. They shortlisted 8 out of 19 flowers nominated. A campus-side "LIKE" campaign was launched from 15 August to 19 September 2016 to engage mass participation from the University community to select the CityU's Official Flower. The recommended Official Flower, Brazil Bougainvillea (簕杜鵑) was subsequently approved by the President's Cabinet on 3 October 2016 based on both its characteristics closely matching with the functional and technical criteria and also its highest result obtained from the "LIKE" exercise.

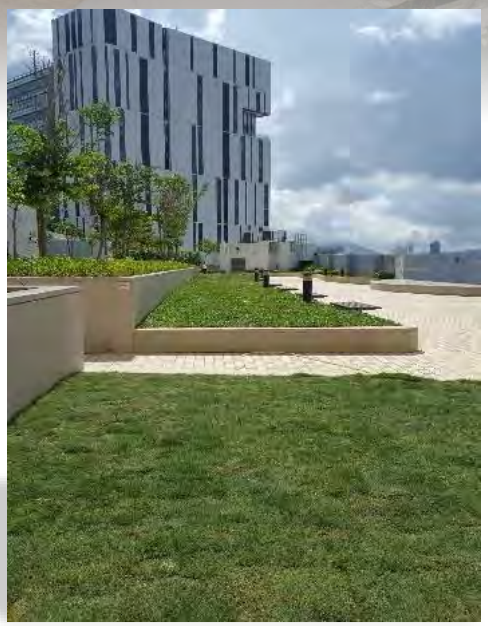
The Announcement Ceremony for CityU's Official Flower held on 7 November 2016 in University Circle. The President, senior management of the University and hundred guests, including colleagues, students and site gardeners attended the Ceremony to share the result and the happy moment. In addition to the announcement, a planting activity of two pots of Brazil Bougainvillea in University Circle was also hosted by the President and Vice President (Administration) during the Ceremony.

5.2 New Initiatives

To ensure tree safety, in June 2017, a tree survey of about 230 heavy trees for Run Run Shaw Creative Media Centre was conducted to identify any trees that have high risk of causing harm to passers-by. Actions have been taken to rectify the trees with immediate danger.

5.3 Improvement

More than 21 landscape improvement works were done throughout the campus.



5.4 Event Support

Potted plants were provided to enrich atmosphere for events.

Brazil Bougainvillea on 19/F of Lau Ming Wai Academic Building

6. Green Measures and Activities in Residential Estates

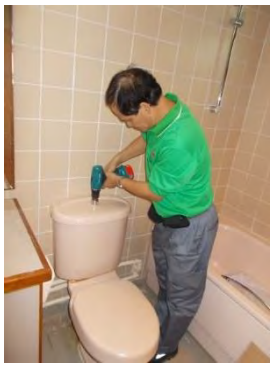
6.1 Energy Conservation

Energy efficiency measure continued to implement in residential quarters. A total of about 1,900 kWh of energy was saved by reducing unnecessary lightings in staircases of Nam Shan Yuen and 0.21 tonnes CO_2-e were reduced.

6.2 Water Conservation

Modified cistern cover with dual press buttons to save water for using in Academic Exchange Building.

(Before)



(After)

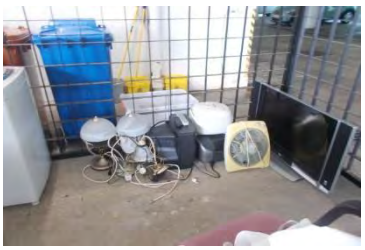
6.3 Food Waste Reduction and Recycling

Mini food decomposers were used to recycle food waste generated from residential quarters in TCY and NSY into fertilizer to conserve our limited landfills. Over 3,000 kg of food waste was collected and recycled into 93 kg of fertilizer which had been applied on campus landscaping areas.

Mini food decomposers used in NSY for recycling into fertilizer

6.4 Waste Reduction and Recycling

(a) The University participated in the Lunar Year-end Recycling Scheme (送舊回收迎新歲) organized by Environmental Protection Department of HKSAR Government and invited residents in Tak Chee Yuen, Nam Shan Yuen and Academic Exchange Building to donate their unwanted domestic electrical appliances for reuse. A total of 14 items were donated by the residents.



(b) With the aim to reduce wastage by reusing some of the materials so as to contribute to a greener Hong Kong, CityU supported and participated in the "Lai See Reuse and Recycling Program" organized by Greeners Action. From 5 February to 22 February 2017, Lai See packet collection boxes were placed at Tak Chee Yuen, Nam Shan Yuen and Academic Exchange Building to collect used Lai See packets for reuse.

7. Green Activities and Collaborations

7.1 Contribution to Student Learning and Teaching

Green Talks & Tours

Over the past 12 months, 9 Green Talks & Tours haven been conducted for over 320 students (associate degree, BSc, MSc) :

- On 28 September 2016, GE 2329 “Green Building : Discovery & Innovations” for 70 BST students;
- On 15 September 2016, filtration plant operation – swimming pool for 30 CCCU students;
- On 18 January 2017, 13 February 2017, 20 February 2017 and 4 March 2017, “Quick-win on energy saving” and Green Buildings for 140 BSE students;
- On 1 March 2017, Green Buildings & Energy for 50 CCCU students; and
- On 1 April 2017, “Quick-win on energy saving” and Green Buildings for 30 SEE students.


01/03/2017


19/01/2017


2016/09/15

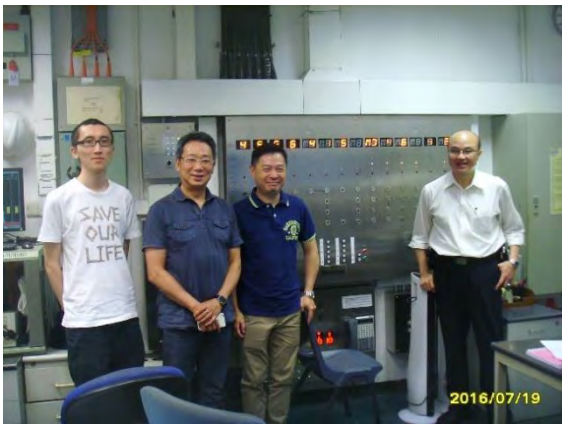

19/01/2017


TRANE

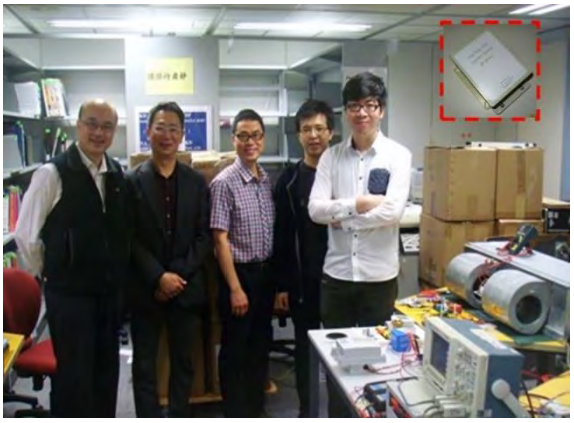

04/03/2017

7.2 Collaboration with Academic Units

To support CityU's teaching & research activities, operation data (such as electricity consumption, chilled water supply temperature, …) are shared with students to carry out system performance analysis. The facilities in operation are considered as part of the "teaching lab".



In addition, in order to assist EE/BST to design and develop "Energy Saver", operating equipment, test field, and work experience on operation and performance of fan coil units have been provided and shared. The "Energy Saver", capable of saving 30% air-conditioning energy, received encouraging support from the Chief Executive Carrie Lam Cheng Yuet-ngor in the HKTDC Electronics Fair 2017. Full scale performance test on the "Energy Saver" is expected to be carried out at CityU in 2018.



7.3 Collaboration with Others

(a) Lai See Packets Recycling

CityU continued to support the "Lai See Reuse and Recycling Program" organized by Greeners Action to collect used Lai See packets from AC1, Student Residence, Tak Chee Yuen, Nam Shan Yuen and Academic Exchange Building during the period from 5 February to 22 February 2017. 100 kg of Lai See packets were collected for reuse.

(b) Hong Kong Green Day

As supporting organization of Hong Kong Green Day that organized by Green Council.

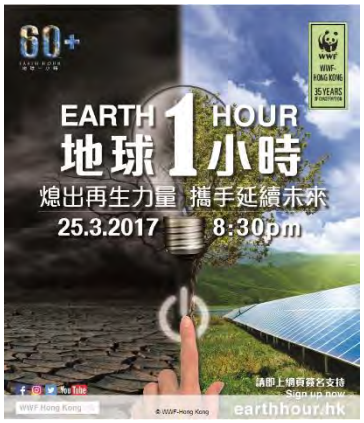
(c) Hong Kong No Air Con Night 2016

The captioned campaign organized by the Green Sense held on 7 October 2016 was a 12-hour-long air-conditioning out action starting from 7:00 pm 7 October 2016 to 7:00 am 8 October 2016 to encourage the whole society to save energy.

CityU actively supported the event by raising the indoor temperature in some communal areas on CityU campus – lecture theatres, Library, Hu Fa Kuang Sports Centre, canteens, Wei Hing Theatre and public areas – to 25°C to lower power consumption.

(d) WWF Earth Hour 2017

CityU supported, as always, the captioned campaign held on 25 March 2017 by turning off non-essential lights in corridors, open / roof gardens, carparks and / or external public areas at YEUNG, Administration Buildings, BOC Building, LI, LAU and CMC for one hour from 8:30 pm to 9:30 pm.



Moreover, City Announcement Portals (CAPs) were issued to all staff and students to encourage them and their families to support this meaningful event by turning off lights in office and at home with the aim to arouse awareness on global warming, energy saving, and reducing emission of pollutants and greenhouse gases.

8. Recognitions and Awards

The following recognitions and awards were received that honoured our efforts in creating a low-carbon campus:

8.1 Waste Check Commitment Award

Signed the Waste Check Charter and got the Waste Check Commitment Awarsd that organized by the Environmental Protection Department of the HKSAR Government.

8.2 Waste Check Promotional Partner Award

Got the Class of Good of Waste Check Promotional Partner Award under the Waste Check Charter programme that organized by the Environmental Protection Department of the HKSAR Government.

8.3 FoodEver Award (Diamond Class)

Got the Diamond Class award under the FoodEver WasteNever Commitment Recognition programme that organized by Hong Kong Women Professionals & Entrepreneurs Association.

8.4 Wastewi$e Certificate

CityU was awarded the “Excellence Level” Wastewi$e Certificate by the Environmental Campaign Committee of the HKSAR Government in recognition of our outstanding effort in waste management. This is the 15th consecutive year that CityU has been awarded the certificate.


香港綠色機構認證
Hong Kong
Green Organisation Certification
減廢證書
Wastewi$e
—Certificate—
「卓越級別」
Excellence Level
香港城市大學 - 校園發展及設施管理處
City University of Hong Kong
Campus Development and Facilities Office

9. Looking Ahead

The University continues to seek out new ways to develop and enhance the university's social and environmental impact while incorporating student learning and development in fields that contribute to global well-being.

At the collegiate level, we will continue to collaborate among our member universities to promote sustainable development.

At the societal level, to support the Government's initiatives in reducing waste disposal and prepare for the Municipal Solid Waste Charging Scheme, we will conduct a trial of the charging scheme on campus.

Over this coming year we look forward to continue working with departments, students, and faculty; peer institutions; and our surrounding community to collectively progress the University's commitment to social and environmental responsibility.

Appendix I

Performance Report

on

Greenhouse Gas (GHG) /

Carbon Reduction

for

City University of Hong Kong Campus

2016 – 17

1. Reporting Entity

This is the Performance Report on Greenhouse Gas (GHG) / Carbon Reduction for City University of Hong Kong (CityU) Campus 2016 – 17 prepared by the Campus Development Office and Facilities Management Office, City University of Hong Kong.

2. Campus Development Office (CDO) and Facilities Management Office (FMO)

The CDO and FMO are charged with the responsibility for administering, managing and coordinating all efforts related to the provision of the required facilities and support services to meet the strategic objectives of the University whose occupiers include students, faculties, staff, staff of affiliated business entities, workers of contractors, and visitors. The affiliated business entities include bank, bookstore, caterers, and health centre. The contractors include the companies who provide the services for cleaning, security, maintenance and construction works.

Energy management and environment protection are part of the duties of the two Offices. We had represented the University to sign the Carbon Reduction Charter which was organized by Environmental Protection Department of the HKSAR Government in July 2008. Commitment is made to conduct carbon audit on campus buildings on a yearly basis and to improve the GHG performance.

3. Reporting Period

This report covers the period from 1 July 2016 to 30 June 2017.

4. Scope of Physical Boundaries

(a) The physical boundaries for this report include the Campus of the City University of Hong Kong which comprises the following:

- Yeung Kin Man Academic Building (YEUNG), Bank of China (Hong Kong) Complex (BOC), Administration Buildings, Li Dak Sum Yip Yio Chin Academic Building (LI), Lau Ming Wai Academic Building (LAU) and External Laboratory Facilities within the Site Lot at 83, Tat Chee Avenue, Kowloon Tong.
- To Yuen Building within the Site Lot at 31, To Yuen Street, Kowloon.
- Run Run Shaw Creative Media Centre within the Site Lot at 18 Tat Hong Avenue, Kowloon Tong.

(b) These buildings are mainly used for the following functional purposes:

- Yeung Kin Man Academic Building (YEUNG): offices, lecture theatres, classrooms, library, computer rooms, plant rooms, machine rooms, workshops, laboratories and research centres.

- Administration Buildings: offices, laboratories, conference rooms, classrooms, workshops, reading room, machine rooms and plant rooms.
- Li Dak Sum Yip Yio Chin Academic Building (LI): offices, lecture theatres, classrooms, computer rooms, plant rooms, canteen and machine rooms.
- Lau Ming Wai Academic Building (LAU): offices, lecture theatres, classrooms, computer rooms, plant rooms, machine rooms, dry laboratories, conference rooms, museum, canteens and carparks.
- To Yuen Building: offices, meeting rooms and conference rooms.
- Run Run Shaw Creative Media Centre: offices, lecture theatres, exhibition areas and conference rooms.

(c) The gross floor areas of the reporting buildings are summarized as follows:

Building	**Approx. Gross Floor Area (GFA) (m^2)**
Yeung Kin Man Academic Building, Bank of China (Hing Kong) Complex, Administration Buildings and External Laboratory Facilities	151,497
Li Dak Sum Yip Yio Chin Academic Building	40,025
Lau Ming Wai Academic Building	42,101
To Yuen Building	6,017
Run Run Shaw Creative Media Centre	23,648

(d) The Academic Exchange Building, Student Residence and all off-campus premises are excluded for carbon accounting in this report.

5. Scope of Operational Boundaries

The carbon accounting in this report will include:

(a) Scope 1 (Direct Emissions) Activities

- Stationary Combustion Sources: emergency genset, and towngas-driven dehumidifiers;
- Mobile Combustion Sources: car fleet serving staff and logistics; and
- Fugitive Emissions: Air-conditioning equipment.

The following will be excluded:

- Motor vehicles operated by outsourced contractors for any activities associated with CityU;
- HFCs and PFCs emissions from laboratory equipment; and
- HFCs and PFCs emissions from refrigeration and air-conditioning equipment which are removed from Campus for disposal.

(b) Scope 2 (Energy Indirect Emissions) Activities

- Electricity purchase from China Light and Power Company (CLP); and
- Towngas purchased from the Hong Kong and China Gas Company (HKCG).

(c) Scope 3 (Other Indirect Emissions) Activities

- GHG emissions due to electricity used for fresh water processing by Water Supplies Department (WSD); and
- GHG emissions due to electricity used for sewage processing by Drainage Services Department (DSD).

6. Methodologies for quantifying emissions and removals

(a) The calculation of scope 2 energy indirect emissions is based on the information from CLP electricity bills, HKCG towngas bills, and WSD water bills.

(b) In lack of accurate information on the paper purchase and inventory, the quantity of paper waste is estimated based on paper collected for disposal and recycling.

7. Information on GHG emissions and removals

The results for GHG emissions and removals for scope 1, scope 2 and scope 3 activities are shown in the Summary Table with detailed calculations shown in Tables 1 – 9 attached.

8. Information on GHG emissions and removals over time

The report format, methodology of accounting and carbon calculations is based on the 'Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong, 2010 Edition' issued by Environmental Protection Department of the HKSAR Government.

9. Information on GHG offsets and programmes

(a) The part of GHG emissions due to the electricity and towngas consumption will be sent to Tertiary Education Facilities Management Association (TEFMA) each year. The information will be published in the annual benchmark survey to all member institutions of TEFMA for reference.

(b) Apart from the figure on net carbon emission, the kg CO_2-e/floor area and kg CO_2-e/person will be used as the ratio indicators to measure performance.

(c) In year 2009, 35 nos. “vacuum type” solar panels (with daily solar energy collection in average total capacity of 85 kWh) were installed on roof of Amenities Building to generate hot water as supplementary heating for shower rooms in Hu Fa Kuang Sports Centre.

(d) It was already a practice adopted by the University to collect paper separately for recycling in the waste disposal process.

Summary Table on Greenhouse Gas (GHG) Emissions and Removal
for Campus of City University of Hong Kong for Year July 2016/June 2017

Updated : 16 Nov 2017

Description (by sources, areas, etc.)	Emissions by gas type [(in tonnes of CO_2-equivalent) (CO_2-e)]					
	Carbon dioxide (CO_2)	Methane (CH_4)	Nitrous oxide (N_2O)	Hydrofluoro-carbons (HFCs)	Perfluoro-carbons (PFCs)	Total
Scope 1 Direct Emissions						
Stationary Combustion Sources						
Standby-generator	3.994192	0.000766903	0.003505232	**N/A**	**N/A**	3.998
Towngas used in Lab.	12.112848	0.004450723	0.014583888	**N/A**	**N/A**	12.132
Mobile Combustion Sources						
Vehicle	57.93058662	0.1048212	5.189887323	**N/A**	**N/A**	63.225
Fugitive Emissions						
Refrigerant used in A/C plant	**N/A**	**N/A**	**N/A**	0		0.000
Other Direct Emissions						
NIL						0.000
Scope 1 Emissions Total	74.03762662	0.110038826	5.207976443	0		***79.356***
Scope 1 Direct Removals						
Planting of Additional Trees based on year 2013/2014						
Campus	-0.667	**N/A**	**N/A**	**N/A**	**N/A**	-0.667
Other Direct Removals						
Vacuum tube solar panel for shower	19.99					19.990
AC3 PV on-grid system	2.628					2.628
Scope 1 Removals Total	22.618	0	0	0	0	***22.618***
Scope 2 Energy Indirect Emission (To be reported in general without being classified into specific gas type)						
Electricity Purchased						
Campus						31,734.833
Towngas Purchased						
Campus						2.818
Scope 2 Emission Total						***31,737.651***
Scope 3 Other Indirect Emissions						
Methane Generation at Landfill due to Disposal of Paper Waste						
Campus	**N/A**	No data	**N/A**	**N/A**	**N/A**	No data
Electricity for Processing Fresh Water (To be reported in general without being classified into specfic gas type)						
Campus						92.113
Electricity for Processing Sewage (To be reported in general without being classified into specfic gas type)						
Campus						37.195
Others						
NIL						0.000
Scope 3 Emissions Total						***129.308***
Other GHG Offsets / Removals						
On-site Renewable Energy Sources for Off-site Uses						
NIL						***0.000***
Off-site GHG Reduction Projects in Hong Kong						
Waste paper for recycling		482.8272				***482.827***
Off-site GHG Reduction Projects outside Hong Kong						
NIL						***0.000***

Summary of Results

Total Scope 1 Emissions :	**79.356**	Tonnes of CO_2-e
Total Scope 1 Removals :	**22.618**	Tonnes of CO_2-e
Total Scope 2 Emissions :	**31,737.651**	Tonnes of CO_2-e
Total Scope 3 Emissions :	**129.308**	Tonnes of CO_2-e
Total other GHG Offsets / Removals :	**482.827**	Tonnes of CO_2-e
Total Net GHG Emissions :	**31,923.697**	Tonnes of CO_2-e
GHG Performance in Ratio Indicator :	**1.157**	Tonnes of CO_2-e / person
	0.121	Tonnes of CO_2-e / m^2

Table 1 : GHG Emissions from Stationary Sources for Year July 2016/June 2017

Step 1	Step 2			Step 3	Step 4	Step 5	Step 6	Step 7	Step 8
A	B	C	D	E	F	G	H	I	J
Source description with location (e.g. boilers, furnances, ovens, and emergency electricity generator etc.)	Fuel Information			CO_2 emission factor	CO_2 emissions in tonnes of CO_2 equivalent ((B x E) / 1000)	CH_4 emission factor	CH_4 emissions in tonnes of CO_2 equivalent ((B x G) / (1000 x 1000) x GWP)	N_2O emission factor	N_2O emissions in tonnes of CO_2 equivalent ((B x I) / (1000 x 1000) x GWP)
	Fuel used		Fuel type						
	Amount	Unit							
AC1(B) Standby-generator	479	litre	diesel oil	2.614	1.252106	0.0239	0.00024041	0.0074	0.001098826
AC1(P) Standby-generator	90	litre	diesel oil	2.614	0.23526	0.0239	0.000045171	0.0074	0.00020646
CMC Standby-generator	425	litre	diesel oil	2.614	1.11095	0.0239	0.000213308	0.0074	0.00097495
AC2 Standby-generator	200	litre	diesel oil	2.614	0.5228	0.0239	0.00010038	0.0074	0.0004588
AC3 Standby-generator	209	litre	diesel oil	2.614	0.546326	0.0239	0.000104897	0.0074	0.000479446
AM Standby-generator	125	litre	diesel oil	2.614	0.32675	0.0239	6.27375E-05	0.0074	0.00028675
Towngas used in Lab	4752	48MJ	Towngas	2.549	12.112848	0.0446	0.004450723	0.0099	0.014583888
Total					**16.10704**		**0.005217626**		**0.01808912**

Note : The towngas being consumed by commercial sector (caterer) is not included.

New CO_2 emission factor 2.549 is applied quoted in EPD's guideline 2010 edition.

Table 2 : GHG Emissions from the Mobile Sources for Year July 2016/June 2017

Step 1	Step 2		Step 3	Step 4	Step 5	Step 6	Step 7	Step 8
A	B	C	D	E	F	G	H	I
Source description (by different vehicle and fuel types)	Fuel Information		CO_2 emission factor [Note 1]	CO_2 emissions in tonnes of CO_2 equivalent ((B x D) / 1000)	CH_4 emission factor [Note 2]	CH_4 emissions in tonnes of CO_2 equivalent ((B x F) / (1000 x 1000) x GWP [Note 4])	N_2O emission factor [Note 3]	N_2O emissions in tonnes of CO_2 equivalent ((B x H) / (1000 x 1000) x GWP [Note 4])
	Amount of fuel used (in litres)	Fuel type						
Road Transport(vehicle no.)								
Petrol Car	14,563.45	petrol	2.36	34.370	0.253	0.077	1.105	4.989
Diesel Car	9,013.33	diesel oil	2.614	23.561	0.145	0.027	0.072	0.201
Navigation								
NIL								
Aviation								
NIL								
Total				**57.931**		**0.105**		**5.190**

Table 3 : HFC and PFC Emissions from Refrigeration / Air-conditioning Equipment (Operation Process) for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
A	**B**	**C**	**D**	**E**	**F**	**G**
Type of refrigerant	Amount of HFC / PFC at the beginning of the reporting period (kg)	Amount of HFC / PFC purchased during the reporting period (kg)	Amount of HFC / PFC disposed (through environmentally responsible means) during the reporting period (kg)	Amount of HFC / PFC at reporting period (kg)	GWP of refrigerant	HFC / PFC emissions in tonnes of CO_2 equivalent ((B + C - D - E) x F / 1000)
R22	0	0	0	0	0	0
R407C	0	0	0	0	1526	0
R410A	0	0	0	0	1725	0
R134a	0	0	0	0	1300	0
R407C	0	0	0	0	1526	0
Total						**0**

Note : R22 is not covered as recognized gases group in Kyoto protocol, the GWP is considered to be zero as stated in EPD's guideline.

Table 4 : Direct GHG Removals from Newly Planted Trees for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4	Step 5
A	**B**	**C**	**D**	**E**
Source description (Location of the trees planted)	No. of trees planted (unit)	No. of trees removed (unit)	CO_2 removal factor [Note] (kg/unit/year)	CO_2 removals in tonnes of CO_2 equivalent ((B-C) x D / 1000 x length of reportingperiod (in years))
Within physical boundary of the Campus as defined	0	29	23	-0.667
Total				**-0.667**

Note : 1. The default figure for the removal potential of each unit of tree is trees commonly found in Hong Kong which are able to reach at least 5 metres in height.

2. The nos. of trees planted or removed in step 2 and 3 are based on year July 2013/June 2014

Table 5 : GHG Emissions from Electricity Purchased from Power Companies for year July 2016/June 2017

Step 1	Step 2	Step 3		Step 4	
A	**B**	**C**		**D**	
Facility / source description (i.e. Area / facilities the electricity bill is reporting)	Amount of electricity purchased (in kWh)	Emission factor (kg / kWh)		Indirect GHG emissions in tonnes of CO_2 equivalent	
		Power company - specific	Territory-wide default value	Power company - specific	Territory-wide default value
Academic 1, Administration Building, Amenities Building and Sport Complex	41,132,644	0.54	0.7	22,211.628	28792.8508
To Yuen Building	765,158	0.54	0.7	413.185	535.6106
Academic 2 & 3	11,032,870	0.54	0.7	5,957.750	7723.009
Academic 3	1,147,722	0.54	0.7	619.770	803.4054
Creative Multimedia Centre	4,689,816	0.54	0.7	2,532.501	3282.8712
Total				**31,734.833**	**41137.747**

Note : The electricity being consumed by commercial sector (caterer, bank and bookshop) is not included.

The Power company specific emission factor 0.54 is extracted from CLP Substantiability Report 2015.

Table 6 : GHG Emissions from Towngas Purchased from the Hong Kong and China Gas Company for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4
A	**B**	**C**	**D**
Facility / source description (i.e. Area / facilities the Towngas bill is reporting)	Amount of Towngas purchased (Unit [Note])	Emission factor (kg / Unit)	Indirect GHG emissions in tonnes of CO_2 equivalent (B x C / 1000)
Towngas used in Lab	4752	0.593	2.818
Total			**2.818**

Note : Each unit registered by gas meter represents that the town gas with a heat value of 48 MJ. The emission factor only accounts for the emissions during the production of Towngas within the company. The GHG emission associated with combustion of Towngas within the physical boundary is reported under Scpoe 1.
New GHG emission factor 0.593 based on year2008 is applied quoted in EPD's guideline 2010 edition.

Table 7 : Methane Generation at Landfill in Hong Kong due to Disposal of Paper Waste for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
A	B	C	D	E	F	C
Source description (i.e. Area / floor)	Amount of paper in storage at the beginning of the reporting period (kg)	Amount of paper purchased during the reporting period (kg)	Amount of paper collected for recycling during the reporting period (kg)	Amount of paper in storage at the end of the reporting period (kg)	Emission factor (kg CO_2-e / kg of waste) Note 1	Indirect emissions in tonnes of CO_2 equivalent ((B + C - D - E) x F / 1000)
Campus	0	100589 Note 2		0	4.8	-482.8272
Total						**-482.8272**

Note 1 : For simplifying the accounting process, the default emission factor assumes that the total **raw amount of CH4 emitted throughout the whole decomposition process of the paper waste disposed at** landfills will be emitted into the atmosphere within the same reporting period as paper waste collected. In addition, the default value does not take into account the reduction in emission due to collect, recovery and utilization of landfill gas due to the management practices at landfills.

Note 2 : The quantity is based on the amount of waste paper collected for recycling. The amount of GHG avoided is also reported as part of the off-site GHG emission reduction efforts.

Table 8 : GHG Emission due to Electricity Used for Fresh Water Processing by Water Supplies for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4
A	**B**	**C**	**D**
Source description (i.e. Area / facilities the water service bill is reporting)	Amount of water consumed as listed on the water service bill (m^3)	Emission factor (kg / m3) Note	Emission in tonnes of CO_2 equivalent (B x C / 1000)
Academic 1, 2 & 3, Administration Building, Amenities Building & Sport Complex, To Yuen Building and Creative Multimedia Centre	217248	0.424	92.113
Total	**217248**		**92.113**

Note : 1. New emission factor 0.424kg CO_2-e /m^3 based on year 2008 is applied quoted in EPD's guideline 2010 edition

2. The fresh water being consumed by commercial sector (caterer) is not included.

Table 9 : GHG Emission due to Electricity Used for Sewage Processing by Drainage Services Department for Year July 2016/June 2017

Step 1	Step 2	Step 3	Step 4
A	**B**	**C**	**D**
Source description (i.e. Area / facilities the water service bill is reporting)	Fresh water consumption (m^3)	Default Emission factor (kg / m^3) Note	Emission in tonnes of CO_2 equivalent (B x C / 1000)
Academic 1, 2 & 3, Administration Building, Amenities Building & Sport Complex, To Yuen Building and Creative Multimedia Centre	216248	0.172	37.195
Total			**37.195**

Note : The default emission factor is determined according to the purpose of water used as follows:

Source description	Default Emission Factor (kg / m^3)
Restaurants and catering services	(0.7 x Emission Factor) assuming 70% of the fresh water consumed will enter the sewage system.
Other commercial, residential and institutional purposes	(1.0 x Emission Factor) assuming 100% of the fresh water cosumed will enter the sewage system.

In which emission factor is the emission factor of GHG emissions due to electricity used for processing fresh water derived from the following equation :
Emission Factor = Unit electricity consumption of processing sewage (from DSD) x Territoy-wide default value (i.e. 0.7kg /kWh) of purchased electricity provided in Table 5.
New emission factor 0.172 kg CO_2-e / m^3 based on year 2008 is applied quoted in EPD's guideline 2010 edition.

Note : The fresh water being consumed by commercial sector (caterer) is not included.

City University of Hong Kong
Tat Chee Avenue, Kowloon, Hong Kong

Facilities Management Office:
http://www6.cityu.edu.hk/fmo/

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