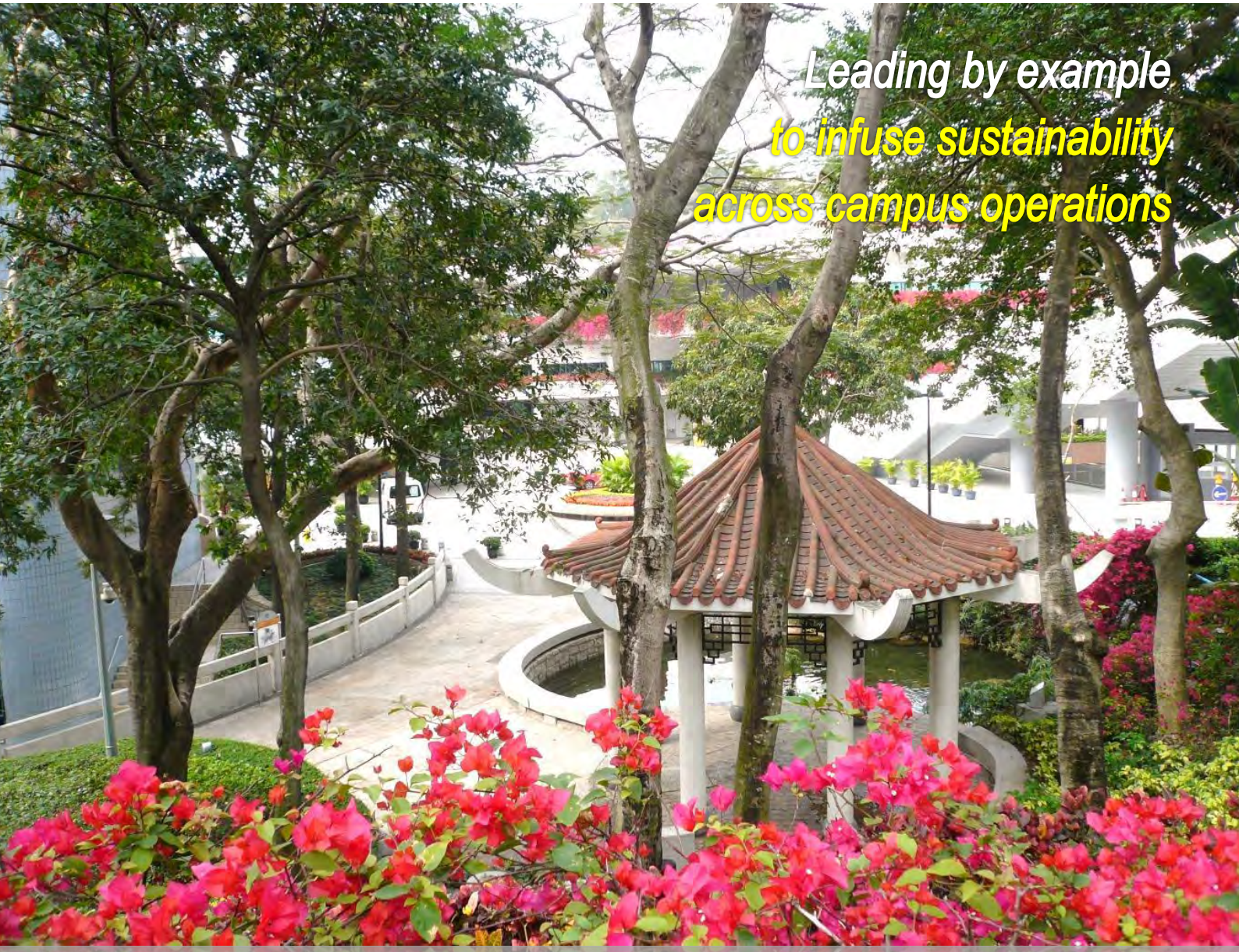
CDFO

Campus Development and Facilities Office
校園發展及設施管理處

香港城市大學
City University of Hong Kong
三十周年紀念 30th Anniversary
專業 創新 胸懷全球
Professional·Creative
For The World

Environmental Report 2013

二零一三年拾荒者年報



June 2014

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Message from the Director

2013 was a challenging year for CDFO in the pursuit of a sustainable campus.

With the implementation of the 4-year undergraduate curriculum, we have a much expanded campus and a larger students and staff population that have driven greater resource use and waste generation. We have been under increasing pressure to manage the impacts of our activities to the environment. Nevertheless, CDFO continued its longstanding commitment to sustainability and continued to play a key role in mitigating the University's environmental impact to the nature through frugal use of resources; reduction in waste generation and carbon footprint.

Our performance was largely achieved through various housekeeping and operational measures which cost us little to do and yet the result has been remarkable.

2013 saw the conclusion of our effort in the 18-month long "Zero Food Waste in CityU" campaign. We hope that the campaign has raised staff and students' awareness of not to waste food.

Readers of this report may be interested to know that CDFO has been identified by many faculties as a potential education outlet. In addition to providing internships for students, it is an emerging trend towards students working with CDFO on campus sustainability projects.

As usual, this report provides not only an update of what colleagues of CDFO have done during the last year, but an opportunity to members of the University community to assess our environmental performance. I welcome your feedback and look forward to your support as we continue our journey towards a sustainable campus.

K Y Wong
Director of Campus Development and Facilities

Our Environmental Performance

What CDFO has achieved in 2013 :

Waste Recycling

- Recycle over 307 tonnes of food waste into fish feed.
- Diverted 197 tonnes of solid waste from landfills.
- Successfully completed the planned promotional activities of the 18-month "Zero Food Waste in CityU" programme.
- Initiated collection of and reuse of used lai see packets on campus and residential quarters.
- Initiated collection of spent seasonal flowers for recycling.

Energy Conservation

- Cut electrical energy consumption by 3.1% (i.e. 1,584,841 kWh).

Water Conservation

- Saved fresh water consumption by 6.1% (i.e. 11,000m^3).

Contribution to Teaching

- Provided another 6-week internship programme for four SA students.

Green Transportation

- Eliminated roadside pollution of 5.1 tonnes of CO_2-e by not using shuttle bus.

Major Award Received

- GOLD Certificate under the Fresh Water Plumbing Quality Maintenance Scheme.
- "CLASS OF EXCELLENCE" Wastewi$e Label.

1. Waste Management

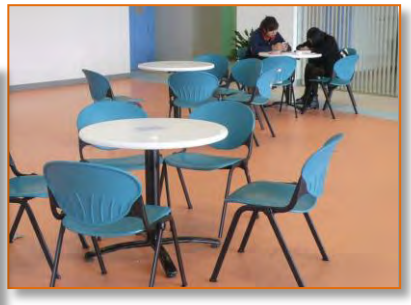
1.1 Solid Waste

(a) Reuse

CDFO has placed considerable effort into re-use of throwaway furniture and salvage building materials. Some examples are given below:


Computer desks re-used in Quiet Study Room 7-201, AC3



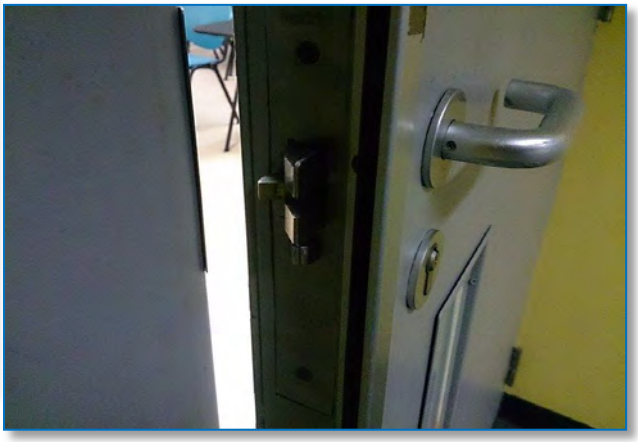


Tables at Learning Common on Floors 5, 6 and 7 of AC3

Sofa on Floor 6, AC3


Tables in Conference Room 5-216, AC3

Office partitions with hanging cabinets dismantled from Ka Chi School and re-used in CMC



Door locks and ironmongery dismantled from office renovation and reinstatement works at Festival Walk and InnoCentre are re-used to replace defective ones.*

(The University de-leased offices at Festival Walk and InnoCentre in Aug. 2013 and Jan. 2013 respectively.)*

Re-use of false ceiling tiles from reinstatement works at Hong Kong Science Park on Floor 4, Amenities Building

(b) Recycle

- **Red Packet Reuse and Recycling**
  In addition to traditional recyclables, we collected some 50kgs Lai See packets for re-use.

(c) Repair / Renew

In order to extend the life of use of the equipment, extensive training was provided to the maintenance staff to broaden and deepen their skills in repairing and salvaging to the largest possible extent the damaged or old equipment, which would otherwise be replaced by new equipment. A number of pressure vessel diaphragms, ball valves, non-return valves, air diffusers, electronic control boards, etc. were repaired and put back into service in the year 2013. An estimate of around HK$359,200 of material cost was saved.

Ball valve serving AC2 kitchen fresh water tank reconditioned

Reduced

198

tonnes solid waste

Summary of Solid Wastes Recovered :

	Year 2012	Year 2013
Waste paper recycled (kg)	101,286	157,098
Aluminium cans recycled (kg)	678	2,711
Plastic bottles recycled (kg)	730	3,783
Printer cartridges recycled (kg)	1,011	1,170
Compact discs recycled (kg)	100	40
Mercury-containing fluorescent tubes and lamps recycled (kg)	13,200	21,200
Electronic ballasts repaired for reuse (pieces)	0	100
Green waste and plant trimmings reused (kg)	208	156
Glass bottles recycled (kg)	7,482	11,702

1.2 Liquid Waste (Effluent)

CityU treats effluent produced from the University vigorously to meet the discharge requirement of the HKSAR Government especially wastewater from our catering outlets and laboratories by putting in place the electroflocculation system and the neutralization system respectively. In addition, to better manage and fully utilize wastewater discharged, a grey water treatment system is installed on campus to recycle wastewater for irrigation.

(a) Electroflocculation System

Electroflocculation involves an electrolytic addition of coagulating ions directly from sacrificial electrodes to remove emulsified oil and grease content from the wastewater. There are two electroflocculation systems which have been installed and operated on Campus since 2004. They managed to treat about 62,000m^3 of wastewater produced from the concerned catering outlets last year to within the effluent discharge limits regulated by the Environmental Protection Department (EPD) of HKSAR Government.

(b) Neutralization System

All the sinks and floor drains in the lab areas on Floors 1, 2 and 4 of Academic 1 are connected by piping down to the Neutralization System, which was installed in the basement of the same building. The System was operated since 1993 and it processed about 36,000m^3 of wastewater discharged from laboratories last year, ensuring EPD's discharge limits are met.

(c) Grey Water Treatment System

This System collects, filtrates and disinfects wastewater from wash basins in toilets and showers in changing rooms, condensate water from air-handling and fan coil units in offices, and discharged water from equipment cooling in laboratories for irrigation.

The system was installed since 2008 and it turns max. 71m^3 of grey water into irrigation water every day, which equates to a daily fresh water consumption of approximately 550 people in Hong Kong.

(d) Rainwater Harvesting

In order to displace a proportion of water that would otherwise be a demand for the supply mains and hence to reduce the University's water footprint, a rainwater harvesting system / tank of 51,400 litres was made available after the completion of AC3 in 2013 for recycling of rainwater for irrigation.

1.3 Food Waste

- **Recycling / Reduction of Leftover Food Waste**

Our operation of collecting and monitoring of food waste collection and recycling has been in its third year. Food waste generated from all catering outlets on campus was collected centrally and recycled into fish feed while that from staff quarters was converted by three mini electric organic waste decomposers into fertilizer for use on campus landscaping areas.

Vigorous monitoring actions were conducted regularly on the food waste collection and recycling processes carried out by the contractor to ensure compliance with contract requirements, which include:

- A performance monitoring checklist titled "九龍生物科技有限公司收集、製作過程的品質保證清單" required to be submitted by the contractor together with supporting documents;
- Submission of evidence of valid licences from relevant authorities for carrying out fish feed production;
- Submission of record of the amount of food waste collected for verification against our own record;
- Checks done on pick-up of food waste against agreed schedule;
- Submission of laboratory test results to prove the quality of fish feed produced;
- Ad hoc and surprise checks made to the treatment plant of the contractor in Yuen Long to ascertain: (i) no dumping of CityU food waste in landfills; (ii) our food waste actually being processed; and (iii) no assignment or sub-contracting of the processes; and
- Visits conducted to the fish farms to ascertain that they are indeed using the fish feed bought from our contractor and that the performance of the fish feed are satisfactory.

Summary of Solid Waste Recovered :

Reduced
307
tonnes
solid waste

	Year 2012	Year 2013
Food waste collected and recycled for making fish feed (kg)	249,553	307,532

As a continuing effort to encourage the University community to be more sensitive to food waste issues, more activities under the "Zero Food Waste in CityU" programme were held throughout 2013.

New Table Stickers

New table sticker for promotion of saving food and reducing food waste was designed and posted at Garden Cafe, City Express, AC2 Canteen and Homey Kitchen. As rice represents the largest portion in food waste, the purpose of the sticker is to remind canteen users to order the amount of rice that they can eat with the aim to reduce food waste.

Demonstration on Food Waste Separation

Demonstrations were conducted from 18 to 22 March 2013 in City Express and AC2 Canteen aiming at raising awareness of staff and students to the problem of generating food waste and showing them how to properly separate food waste for recycling.

Trial Use of Bokashi Food Waste Recycling System by CityU Students

Food waste was mixed with Bokashi micro-organism and kept tight in a container for composting for 14 days. The composted food waste was mixed with soil for curing for 4 weeks before use.

Food Waste Reduction and Recycling Sharing Session 減少及回收廚餘交流會

The sharing session was conducted on 23 April 2013. Latest researches on food waste treatment in CityU were shared by professors of SEE, which include turning food waste to electricity and to petroleum-like products. Save Food Ambassadors also shared their experience of carrying out save food promotion and demonstration of food waste separation in canteens. In addition to members of University community, staff / student members of other seven local UGC-funded universities also attended the sharing session.

Waste Reduction Sharing Forum for Administration Staff

A sharing forum was organized on 24 July 2013 to facilitate administration staff in Schools / Colleges / Departments / Centres / Offices of CityU responsible for organizing events to exchange experience and ideas and to learn from experts on arranging for provision of food & refreshment and food waste management.

Zero Food Waste in CityU Summing-up Sharing

A summing-up sharing session was conducted on 7 August 2013 with the purpose of sharing our work done and experience gained during the past 18-month among ourselves and the seven UGC-funded universities.

Visit to Food Education Centre (食物資源教育中心)

Three sessions of visit to the Centre were organized to facilitate members of the University community to get the following experiences. There were more than 60 participants.

- Food waste composting
- Organic farming
- Farming without soil
- Products made from food waste
- Food waste composters / treatment machines

Visit to Kowloon Bay Waste Recycling Centre

Two sessions of visit to the Centre were organized. A total of 35 participants attended the visits.

1.4 Hazardous Waste

Listed in the table below are the quantities of hazardous wastes disposed of safely and in accordance with the laws of HKSAR Government in Year 2012 and Year 2013:

	Year 2012	Year 2013
Liquid Chemical Waste # (L)	12,974	11,980
Solid Chemical Waste # (kg)	13,572	22,000
Clinical Waste * (kg)	1,860	1861
Liquid Radioactive Waste + (L)	2.5	39
Solid Radioactive Waste + (kg)	2.5	10.3

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.*

\+ *Disposal strategy of storage / decay being used for radioactive waste with very long half-life.*

1.5 Rationalization of Dust Bins

In order to reduce the use of plastic bags associated with dust bins usage, to streamline cleaning manpower in emptying dust bins and to encourage reduction in rubbish generation, we have made tremendous efforts in cutting down the total number of dust bins in the communal areas of our Run Run Shaw Library from 150 to 75 in two phases and also in the classrooms on Floor 5, AC1 from 66 to 9.

2. Air Quality Management

2.1 Outdoor Air Quality

(a) Vehicle Exhaust

Reduced

5.1

tonnes CO_2-e

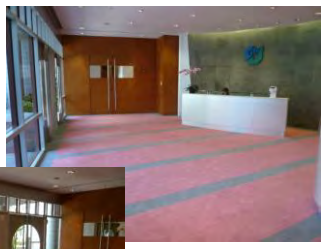
A purposely planned and designed traffic-free and convenient pedestrian passage was completed to enable commuting between main campus and SR / CMC by walking, which eliminated the need of shuttle bus services starting 1 June 2013. A reduction in carbon footprint of 5.1 tonnes CO_2-e was achieved last year.

From Main Campus to SR and CMC

2.2 Indoor Air Quality

(a) Minimization of Indoor Air Contamination on Campus

A home-made environmentally friendly cleaning agent made from orange peels and vinegar is being used on campus to eliminate use of traditional cleaning materials. Its cleansing effect was effective and satisfactory.



An environmentally friendly carpet was adopted for use in the corridor on Floor 4 of CYC Building. The carpet is made of bio-based textile polymers which are renewably sourced. Its face fibre can be recycled and provides stain resistance allowing easy cleaning. In addition, since the carpet has no peculiar smell and is anti-bacteria and anti-fungi it will not cause IAQ concern / problem.

(b) Improvement of Ventilation System

High concentration of CO_2 and unpleasant smell emitted from the photocopiers being used in Information Space of Library were rectified by replacing with high efficiency air filters and installing additional exhaust air duct.

The air ducts with smelly internal linings in laboratory room P1800 of Electronic Engineering Department were replaced with ducts having no internal linings.



(c) Improvement of Indoor Air

Sucking in cooking smell into Nam Shan Building from nearby hot food kiosks was eliminated by teeing off an air duct from the fresh air supply duct connecting to the PAU. Fresh air is now supplied from the roof instead of from the façade facing the food kiosks.

Retrenching of / sucking in cooking smell from AC2 kitchen into AC2 and AC3 premises was solved by diverting the kitchen exhaust from 6/F to roof top.

(d) Enforcement of Smoking Ban on Campus

Security guards are deployed to patrol smoking black spots regularly to deter smoking on campus. In addition, Posting of warning notices at strategic locations, issuance of email messages and reporting of smoking complaints to Tobacco Control Office of the Department of Health of HKSAR Government are also carried out by our campus management team to remind users not to smoke on campus.

(e) Control of Building Works

Our project and / or maintenance teams seek the co-operation from and monitor the worksites of our contractors to put in place effective environmental mitigation measures to minimize the impacts of dusts, dirt, noises and nuisance odour to campus users and to the environment when carrying out works. Also, water-based paints and “low VOC” building fabric materials (e.g. carpet, ceiling tiles, etc.) are used in renovation works to reduce the emission of VOC into the indoor environment.

(f) IAQ Survey

An on-going system of monitoring IAQ is in place. The results were very good with all areas achieving Level “good class” IAQ objective. The main air quality issue of formaldehyde and / or TVOC vapour from new furniture or from renovation works and furniture replacement is also monitored by carrying pre-occupancy IAQ survey in newly built or renovated office areas.

3. Water Conservation, Consumption and Management

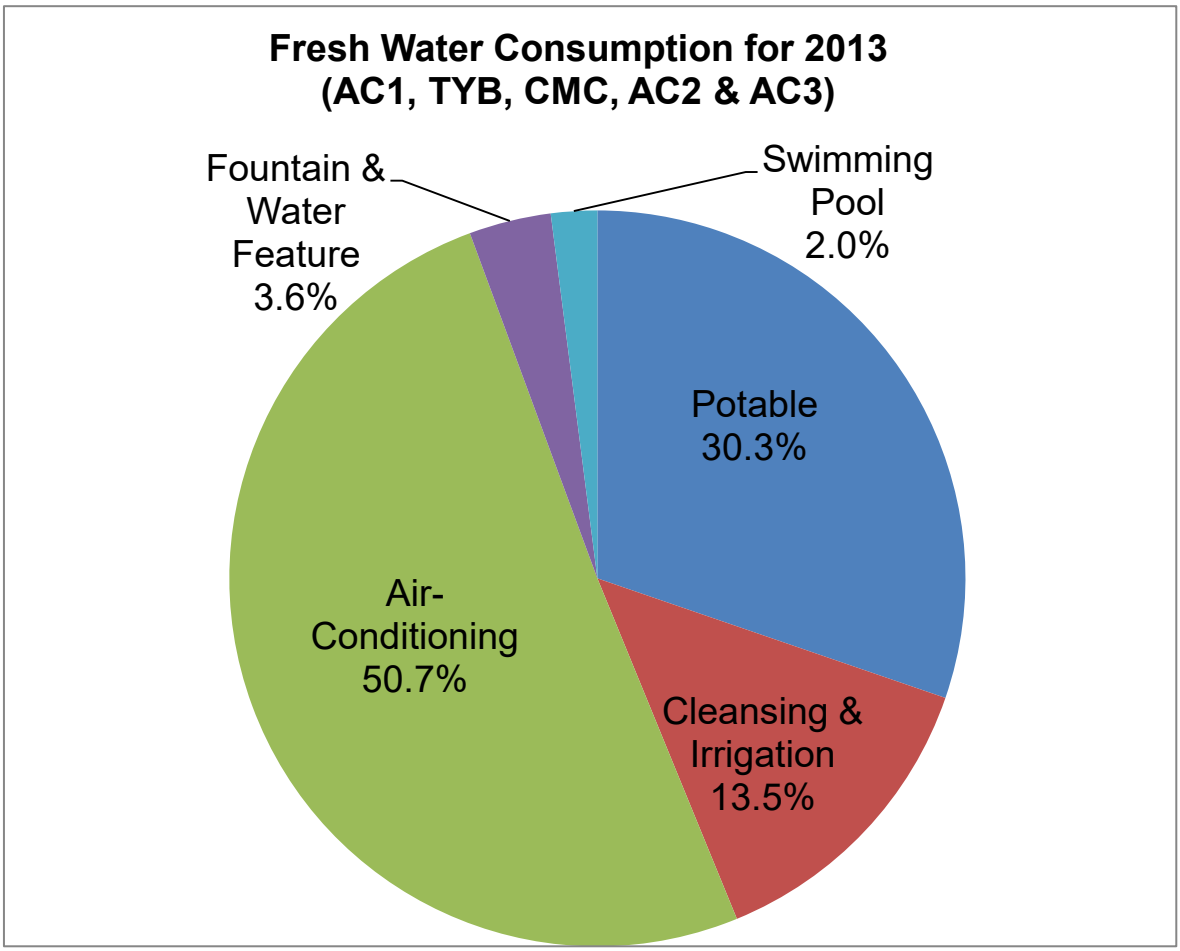
The University has been able to decrease water consumption in 2013 even though the number of students has increased and AC3 was added in the building portfolio.

3.1 Water Consumption and Management

The fresh water consumption on campus for various purposes in year 2013 is depicted in the following table and pie chart.

		2012		2013	
		m^3 (x1000)	%	m^3 (x1000)	%
1	Potable Water				
	Amenities Building & Sports Centre	16.4	9.4	11.9	7.3
	Academic & Administration Buildings	38.4	21.9	34.0	20.7
	To Yuen Building (TYB)	0.7	0.4	0.5	0.3
	Run Run Shaw Creative Media Centre (CMC)	0.7	0.4	0.7	0.4
	Academic 2 (AC2)	7.0	4.0	1.7	1.0
	Academic 3 (AC3)			0.9	0.6
	Subtotal	63.2	36.1	49.7	30.3
2	Cleansing & Irrigation				
	Amenities Building & Sports Centre	8.1	4.6	9.2	5.6
	Academic & Administration Buildings	24.2	13.8	10.1	6.1
	TYB	0.1	0.0	0.1	0.1
	CMC	1.2	0.7	0.9	0.6
	AC2	0.7	0.4	0.4	0.3
	AC3			1.5	0.9
	Subtotal	34.3	19.6	22.3	13.5
3	Air-conditioning				
	Academic 1 (AC1)	50.8	29.0	63.3	38.6
	AC2	12.4	7.1	13.4	8.2
	AC3			6.3	3.9
	Subtotal	63.2	36.1	83.1	50.7
4	Fountain & Water Feature	11.8	6.7	5.9	3.6
5	Swimming Pool	2.6	1.5	3.3	2.0
	Yearly Total (x1000m^3)	175.0		164.3	
	Consumption / month (x1000m^3)	14.6		13.7	
	Consumption / day / person[+] (litre)	17.2		15.9	

[+] Note : The total number of staff and students in 2012 and 2013 are 27,875 and 28,261 respectively.



3.2 Water Usage Performance

Used

6.1%

less water

Compared with that of year 2012, the annual fresh water consumption in year 2013 decreased by 6.1% and the following particulars were observed :

(a) Potable water consumption decreased by 21.34% compared with 2012 due to campus-wide use of water saving aerators.

(b) The cleansing and irrigation water consumption was decreased by 35% because more recycled water was used.

(c) The water consumption for the evaporative cooling tower of air-conditioning plant was increased by 31.45% as compared with that of year 2012. It is because more energy efficient water-cooled chillers were used in daily operation last year.

(d) The water consumption of fountain & water features was decreased by 50% due to completion of replacement of leaking underground pipes and suspension of fountain and water features for maintenance.

(e) Compared with that of year 2012, the water consumption due to water replenishment for swimming pool in year 2012, increased by 26.9% in 2013. The increase is due to the discrepancy between old and new water meters of Water Supplies Department.

3.3 Use of Waterless Urinal System

Saved

24,166m^3

flushing water

The 'Desert Cube Waterless Urinal System' was extended to more than 48 male toilets on campus achieving a saving of over 24,166 m^3 of flushing water in 2013. That represents an annual reduction in carbon emission of about 4.2 tonnes CO_2-e.

3.4 Potable Water Saving Measures (W1)

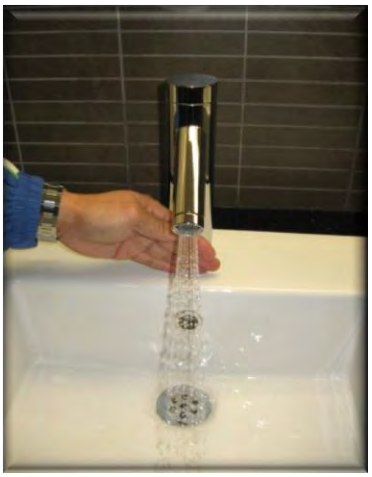
Saved

4,860m^3

potable water

A total of 150 water saving aerators were installed for washbasin taps in toilets of AC3. An annual saving of about 4,860 m^3 of potable water was achieved which is equivalent to an annual reduction in carbon emission of about 2.1 tonnes CO_2-e.

Before



After

4. Energy Conservation

In year 2013, we continued to explore ways to improve the energy efficiency of building services systems in either existing installation or renovation works. Among them, following are those major items having been done:

4.1 Energy Efficiency Improvement

(a) Energy Efficiency Improvement in Mechanical Ventilation and Air-conditioning System

(i) Use of water-to-water Heat Pump for Dehumidification Control in Air Conditioning

Two sets of 50 kW water-to-water heat pump are used to enhance dehumidification control in air conditioning for function rooms of Run Run Shaw Creative Media Centre. Compared with using electric heating in the dehumidification process, heat pump system (with Coefficient of Performance (COP) = 4.86) is 80% more energy efficient.

(ii) Use of Air-to-air Heat Exchanger for Heat Recovery in Fume Extraction System

In new wet laboratory of School of Energy and Environment, an air-to-air heat exchanger is used to recover energy from the cooled fume exhaust at 22°C dry bulb temperature to pre-cool the hot and humid fresh air intake in summer months with mean temperature at 26.7°C. It results in an energy saving of 19,507 kWh annually in the air-conditioning system operation.

(iii) Energy Efficient Data Centre

An energy efficient air-conditioning system using 'hot & cold aisles' method was built for the extension areas of Data Centre. In this method, localized cooling is provided for computer equipment. Compared with conventional air-conditioning system for computer room, 25% of energy can be saved in the air-conditioning operation.

(iv) Raising of Room Temperature in Classrooms

Reduced 128.8 tonnes CO_2-e per year

Ceiling-mounted ventilation fans were installed in 9 numbers of classrooms for increasing the air movement. By such doing, the room temperature set-point can be raised to 25.5°C without compromising the human comfort. This initiative results in an energy saving of air-conditioning by 2%.

(v) Interconnection of Different Chilled Water Plants

Reduced 146.8 tonnes CO_2-e per year

In order to fully utilize most energy efficient water-cooled centrifugal chillers in one specific chiller plant to serve all areas of AC1, separated chiller plants were inter-connected for operation. By such arrangement, chilled water can be distributed to all areas from each plant flexibly. As a result, energy saving of 233,000 kWh can be achieved annually.

(b) Energy Efficiency Improvement on Lighting System

Reduced
84.5
tonnes CO_2-e per year

(i) De-lamping in Library and Public Corridors

De-lamping was carried out at those overlit areas (e.g. exhibition area at entrance of Library and common corridors) for energy saving without compromising the safety and functional use. There is 1,144 nos. of lighting fixture in total had been de-lamped.

De-lamping at exhibition area of Library

Reduced
127.3
tonnes CO_2-e per year

(ii) Use of LED Lamps

Energy efficient LED lamp bulbs were widely used to replace T8 fluorescent tubes in carpark of AC1, general lighting in public areas of AC3, and display spotlights in various areas.

15W LED lamp in carpark

LED lamp used in public area of AC3

(c) Summary of Energy Efficiency Improvement Initiatives Completed in Year 2013

Excluding those energy efficient features provided for new renovation works mentioned in item 4.1(a)(i) to (iii), energy saving and carbon reduction achieved through the use of energy efficiency improvement initiatives in existing facilities are summarized as follows:

Reduced

538.5

tonnes CO_2-e per year

Description	Estimated Annual Saving (kWh)
Replacement of display spotlight by energy efficient LED lamps in various areas	129,863
Replacement of T8 fluorescent tubes by 15 W LED lamps in AC1 carpark	70,460
De-lamping or switching off of decorative lighting in overlit areas including communal areas and Library	134,200
Replacement of 250 W high bay lighting by 150 W LED lamps	1,800
Installation of timers to switch off air-side equipment in AC2 for shortening the operating hours	81,100
Use of energy efficient water-cooled chillers to provide air-conditioning service to all areas in AC1 by interconnecting the chilled water pipes of chiller plants between different zones	233,000
Increase of room temperature set-point by 1^{o}C for Canteen, Library, lecture theatres and communal areas	200,000
Adoption of ceiling-mounted ventilation fans to increase air movement and raising of room temperature set-point in classrooms	4,400
Total (kWh)	**854,823**
Total reduction in carbon emission per year	**538.5 tonnes** *(equivalent to planting 23,415 trees)*

4.2 Use of Renewable Energy

Offset
24.7
tonnes CO_2-e per year

In year 2013, a total renewable energy of 39,216 kWh (equivalent to 24.7 tonnes of CO_2-e) was generated annually on campus and Student Residence through the following installations:

- PV solar panel connected to electricity grid in Student Residence;
- Solar panel/wind turbine hybrid lamp poles in Student Residence;
- "Evacuated tube" type solar thermal panel at Sports Centre in AC1; and
- PV solar panels connected to electricity grid in AC3.

Although renewable energy generation constitutes only about 0.1% of CityU's annual electricity consumption, CityU demonstrates our social responsibility to reduce carbon emission by utilizing renewable energy locally on campus as much as possible within the physical constraint.

4.3 Operational, Maintenance and Monitoring Measures

Reduced
318.2
tonnes CO_2-e per year

It is recognized that remarkable energy saving can be achieved with minimal cost through housekeeping measures in our daily operation, maintenance and monitoring of the building services systems. In year 2013, we continued our effort to explore various energy saving opportunities. Among them, some key initiatives are iterated as follows :

(a) To shorten the operating hours of air-conditioning service for some laboratories in AC1.

(b) To raise room temperature set-point of air side equipment for communal areas, Library, lecture theatres and canteen.

(c) To switch off decorative ceiling lights in AC3.

(d) To install timer to switch off air-side equipment after the campus is close or shortening the operation hours in daytime in AC2.

(e) To monitor the power quality (i.e. power factor, load factor, and etc.) of various buildings through energy meters and the web-based power management system.

4.4 Pilot Automated Demand Response (ADR) Programme

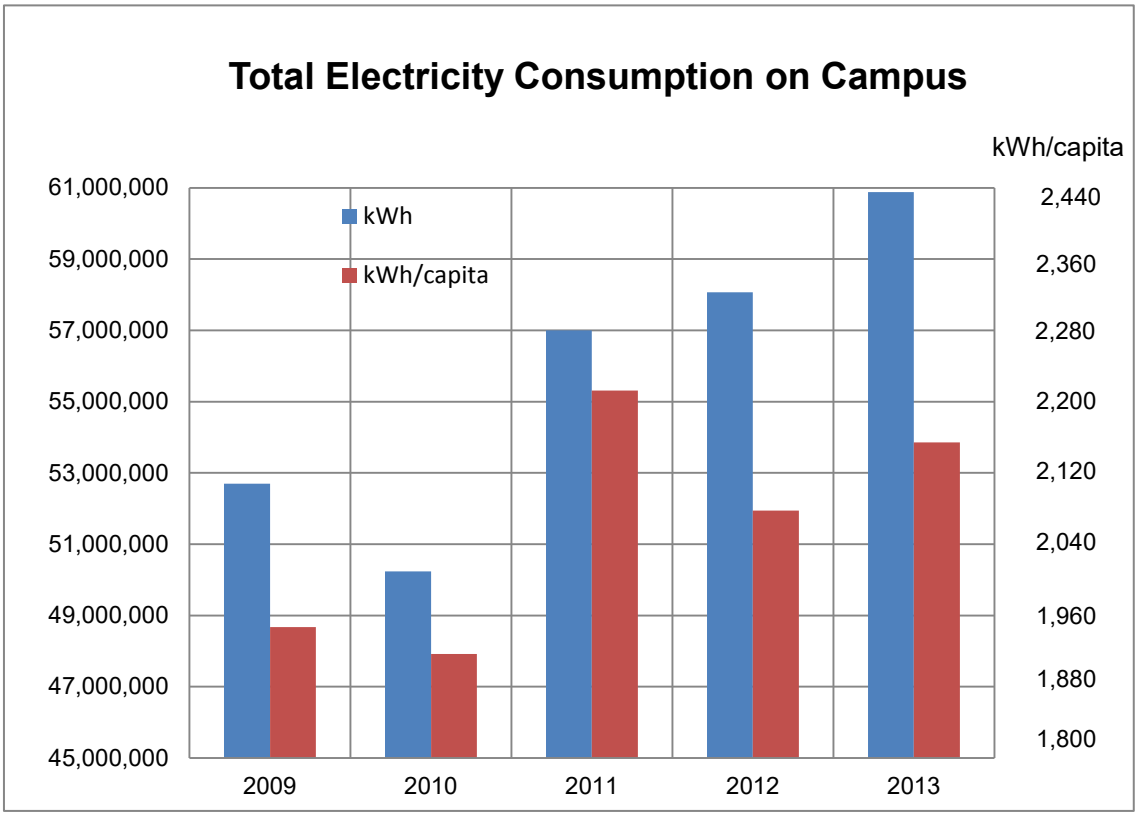
In June 2013, an agreement of 'Pilot Automated Demand Response Programme' was signed between CityU and China Light & Power (CLP). CityU worked out the strategy of load shedding in air-conditioning system during the power grid peak hours from June to September 2013. Through this pilot program, CLP can evaluate the impact of peak demand on power generation equipment investment if consumers reduce their electricity load during the power grid peak hours. In return, CityU reduced its electricity consumption by 1,762kWh and benefited from CLP's financial incentive of $22,800.00 during the program period.

4.5 Sustainability and Energy Efficient Design in Alteration Works

As a good practice, we incorporate appropriate sustainable and energy efficient features into the design of our renovation works. For major retrofitting works which involve addition/replacement of building services installation, we ensure the design of building services to comply with the last Building Energy Efficiency Ordinance (BEEO) which was effective since September 2012. For example, the lighting power density (LPD) in the recent Library renovation project is limited to 15 W/m^2 by using energy efficient LED lamps and T5 florescent lighting fixtures.

4.6 Energy Conservation Performance

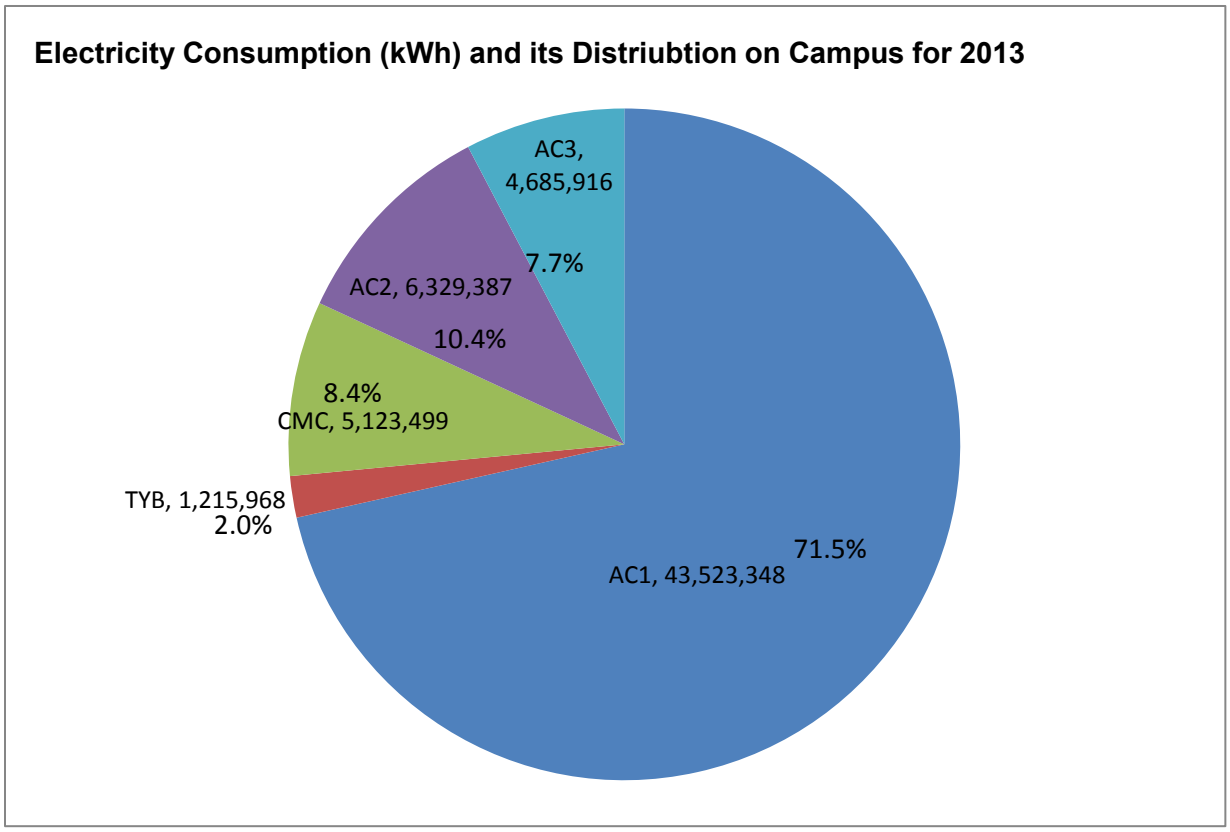
After the double-cohort academic curriculum was introduced in year 2012/2013, the number of undergraduate students and the building premises increased by one third and 18.4% respectively. Despite the drastic increase in both student population and building areas, the total electricity consumption on campus and energy (kWh) per capita (total no. of students and staff) in year 2013 remained a slight increase of 4.8% and 3.7% respectively compared with year 2012 (refer to the chart below). Such encouraging result proves that our effort in energy management is effective.



	2009	2010	2011	2012	2013
kWh	52,692,853	50,231,662	56,999,908	58,067,596	60,878,118
kWh/capita	1,947	1,917	2,212	2,078	2,154

In recent years, new buildings were completed to cater for the increase in number of students. The current portfolio of premises on campus includes Academic 1, Academic 2, Academic 3, Run Run Shaw Creative Media Centre, and To Yuen Building. Electricity Tariff for each building and the energy consumption comparison between 2012 and 2013 are summarized in following tables. It reveals that energy saving has been achieved in each buildings regardless the increase of students and staff population by 1.1%. Such performance is attributive to our effort in energy conservation ceaselessly applied to all buildings.

Electricity Tariff and Unit Charge for Buildings		
Location	Unit Charge ($)	Tariff Type
AC1	0.925	Large Power
AC2	0.997	Bulk
AC3	0.999	Bulk + General Services
CMC	0.987	Bulk
TYB	1.088	Bulk



Legend:

AC1: Academic 1
AC2: Academic 2
AC3: Academic 3
CMC: Run Run Shaw Creative Media Centre
TYB: To Yuen Building

Electricity Saving by Buildings on Campus			
	2012 (kWh)	**2013 (kWh)**	**Percentage Change (%)**
AC1	44,958,465	43,523,348	-3.2
AC2	6,619,940	6,329,387	-4.4
AC3	-	4,685,916	-
CMC	5,191,260	5,123,499	-1.3
TYB	1,297,931	1,215,968	-6.3
Total		**60,878,118**	

Distribution of Energy Expenditures by Buildings (on Campus and off Campus)						
Area	**Category**	**Jan – Dec 2009**	**Jan – Dec 2010**	**Jan – Dec 2011**	**Jan – Dec 2012**	**Jan – Dec 2013**
Campus	Electricity ***[i]***	$40,831,557	$40,972,059	$40,242,421	$44,861,719	$46,629,377
	Gas ***[ii]***	$6,053	$5,464	$4,458	$4,889	$4,388
Senior Staff Quarters ***[iii]*** (Public area)	Electricity	$365,626	$413,868	$373,260	$378,281	$396,987
Academic Exchange Building ***[iv]***	Electricity	$781,425	$767,872	$709,410	$812,692	$686,702
External Offices ***[v]***	Electricity	$1,172,352	$1,413,704	$1,322,835	$1,480,249	$2,261,318
Total energy cost incurred		**$42,898,187**	**$43,157,013**	**$42,652,383**	**$47,537,829**	**$49,978,772**

Remark :

[i] *Campus includes AC1, Administration Building and Amenities Building and Sports Centre. AC2, AC3, CMC & TYB, are included but exclude catering outlets, Bookshop and Hang Seng Bank.*

[ii] *include gas-dehumidifiers installed in EE laboratory on Floor 2, Fong Yun-wah Building.*

[iii] *include public area for Tak Chee Yuen and Nam Shan Yuen.*

[iv] *include public area and SCOPE.*

[v] *include offices in Festival Walk Tower, Grandtech Centre, Chak On Centre, InnoCentre, Hong Kong Science Park, Kin Fat Industrial Centre, Ka Chi School and Nam Shan Building.*

4.7 3-year (2012-2014) Carbon Reduction / Energy Saving Plan

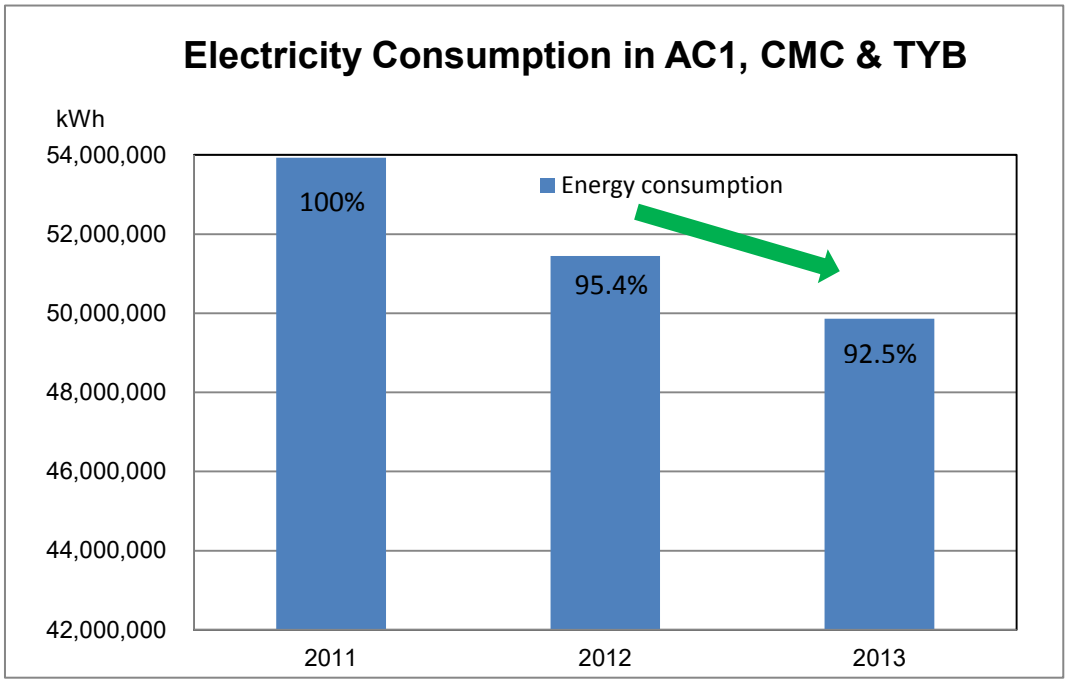
The Plan

A 3-year (2012-2014) plan was promulgated in year 2012 with a target to achieve a reduction of 6% (year-to-year) in energy consumption by end of year 2014, using year 2011 as the baseline of benchmarking.

There is an abrupt change of premises portfolio after new buildings were completed in this period. Therefore, for the sake of consistency, our performance benchmarking will be based on electrical energy consumption/carbon emission from only those buildings existed in 2011's portfolio (i.e. AC1, CMC & TYB).

Benchmarked with year 2011, 7.5% saving (year-to-year) was achieved which is ahead of our 6% target in 3-year energy saving plan. Compared with year 2012, 3.1% reduction in energy consumption was achieved in year 2013. The performance data are summarized as follows:

	2011	2012	2013
Electrical Energy Consumption (kWh)	53,926,444 (100%)	51,447,656 (95.4%)	49,862,815 (92.5%)
Equivalent GHG Emission (tonnes)	31,817 (100%)	29,840 (93.8%)	31,414 (98.7%)



4.8 Energy Consumption Analysis

For the ease of conducting analysis for the period between 2011 and 2013, same portfolio of buildings on campus (viz., AC1, CMC & TYB) in 2011 is used for comparison. New buildings (AC2 and AC3) completed in recent two years were excluded in the analysis.

(a) Energy Consumption

(i) Trend of Consumption

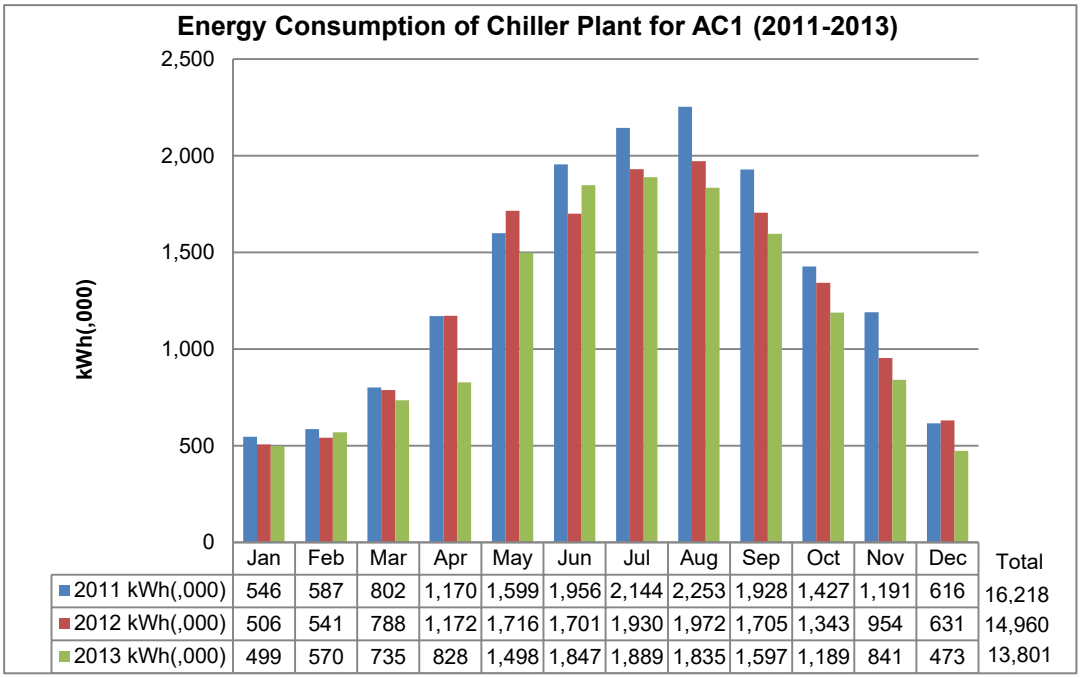
The energy consumption trend of the campus (excluding AC2, AC3, Student Residence and University premises located off-campus) in year 2013 and its comparison of performance indicators with that in preceding years are summarized as follows :

Period	2011	2012	2013
Energy consumption (kWh)	53,926,444 (100%)	51,447,656 (95.4%)	49,862,815 (92.5%)
Cost of energy	$44,589,633	$44,861,719	$46,629,377
Cost per kWh	$0.827	$0.872	$0.935
Total AC1, CMC & TYB gross floor area(m^2)	189,858.00	189,858.00	189,858.00
Total no. of student and staff [(i)]	25,764 (100%)	27,946 (108.5%)	28,261 (109.7%)
Energy consumption per m^2 (kWh/m^2)	284.04 (100%)	270.98 (95.4%)	262.63 (92.5%)
Energy cost per m^2	$234.86 (100%)	$236.29 (100.6%)	$245.60 (104.6%)

Note [(i)] – the source of data is from Office of the Provost.

In year 2013, buildings consumed 49,862,815 kWh of energy. Compared with year 2012, the energy consumption has decreased by 3.1%. The energy saving in year 2013 is mainly attributable to the following factors :

- Energy consumption in chiller plant saw a significant reduction of 7.75% using year-to-year comparison between 2013 and 2012. Total energy saving in chiller plant operation is 1,158,690kWh which constitutes a large share of 73.1% in total energy saving.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2011 kWh(,000)	546	587	802	1,170	1,599	1,956	2,144	2,253	1,928	1,427	1,191	616	16,218
2012 kWh(,000)	506	541	788	1,172	1,716	1,701	1,930	1,972	1,705	1,343	954	631	14,960
2013 kWh(,000)	499	570	735	828	1,498	1,847	1,889	1,835	1,597	1,189	841	473	13,801

Good performance of energy saving in air-conditioning system was achieved because:

a) Air-cooled chillers of relatively lower energy efficiency were minimized for operation in night time. Also, since June 2013, air-conditioning for all areas was serviced by the water-cooled chillers in most of the time after interconnection of chilled water piping between plants.

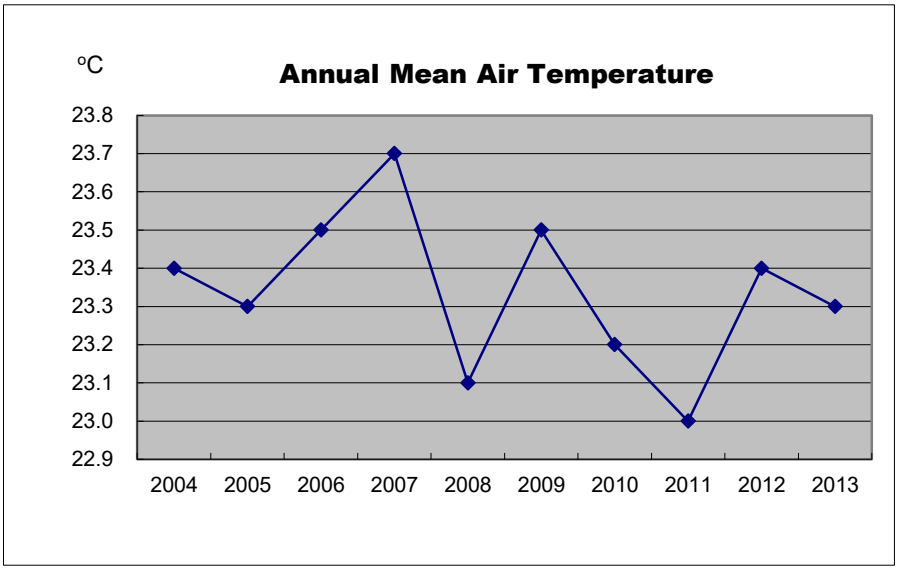
b) Shortening the operation hours of air-conditioning service for some laboratories in AC1.

c) Increase of room temperature set point by 1°C for canteen, Library and lecture theatres in AC1.

- Energy saving resulted from de-lamping or switching off decorative lighting in communal areas and Library.

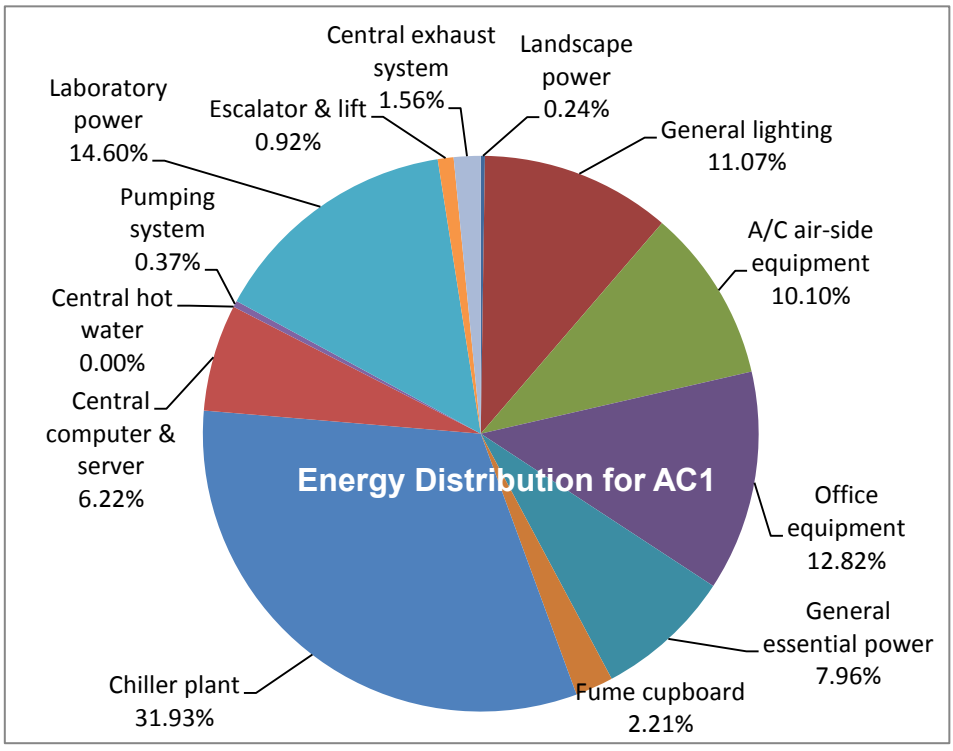
- Energy saving resulted from using LED lamps to replace display spot lights and high bay lights in covered part of drive way on Campus Ground Level.

- Compared with year 2012, the average outdoor mean temperature of year 2013 (23.3°C) is 0.1°C lower. As cooling load due to heat transfer at building skin and fresh air supply has a close correlation with the ambient temperature, the energy of chiller plant operation was reduced accordingly.



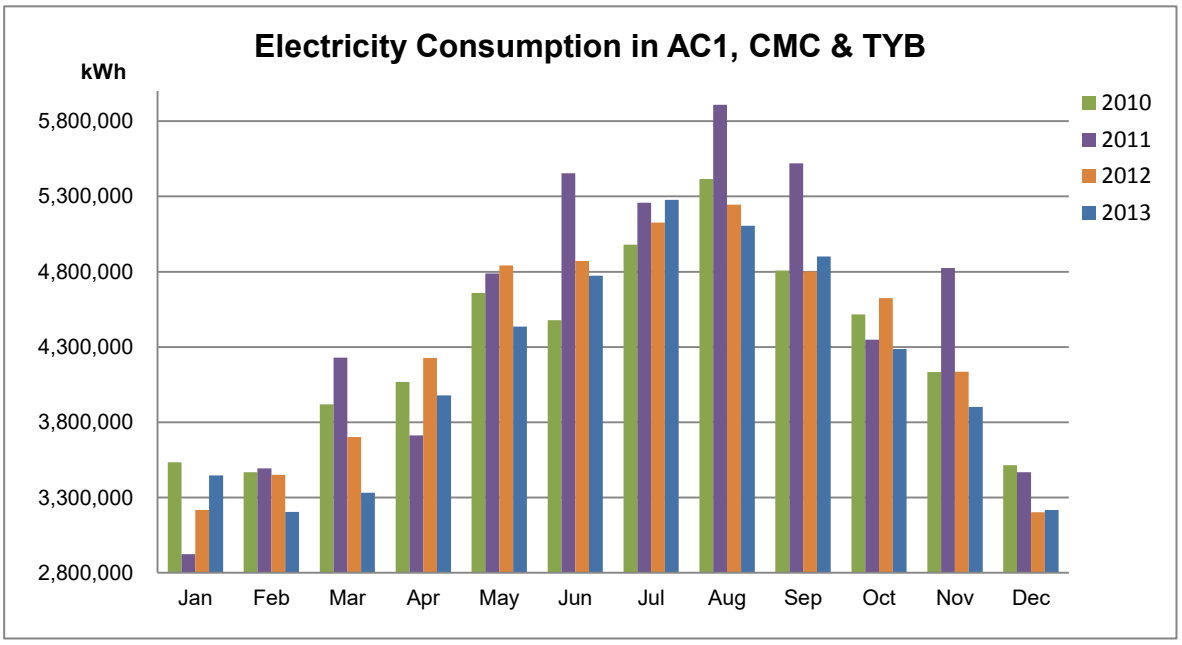
(ii) Consumption Distribution

The largest energy consumption in AC1 is attributed to the central air-conditioning plant which represents 31.9% of the total, followed by laboratory power (14.6%), office equipment (12.8%), general lighting (11.1%) and air-conditioning air-side equipment (10.1%).



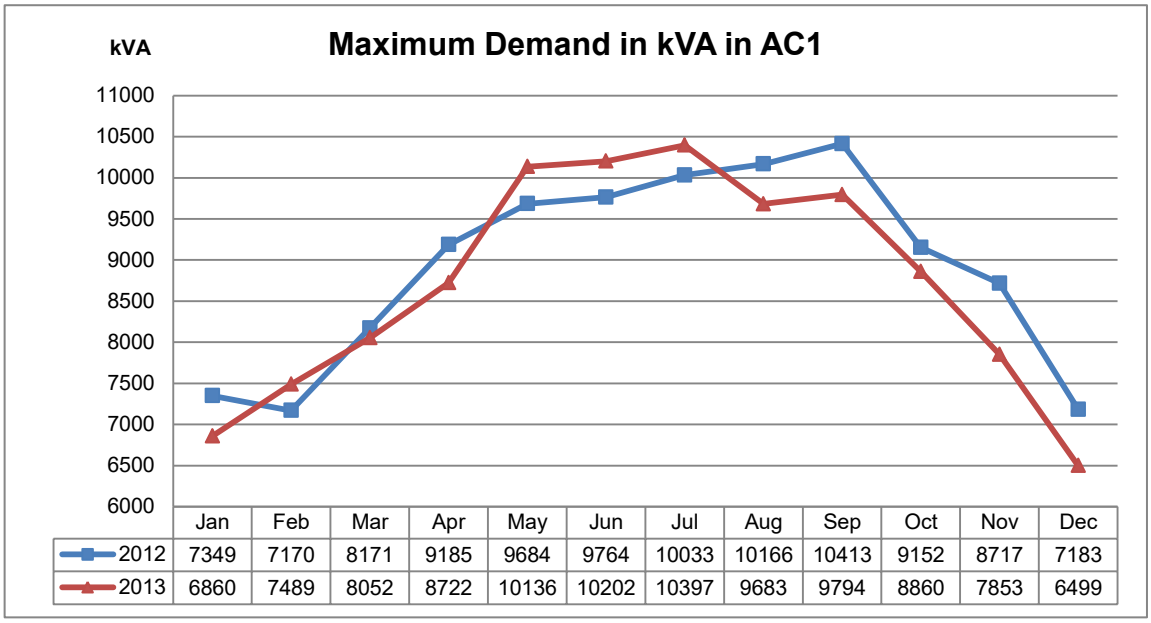
(iii) Month-to-month Energy Consumption Pattern

Compared with year 2012, the monthly electricity consumptions in 2013 generally decreased. In particular, it is more obvious between February and May 2013. Significant energy saving was found in March and May. On the contrary, higher energy consumption was found in July and September compared with year 2012. The reason is that the overall chiller plant operation efficiency in AC1 declined in this period when one energy efficient water-cooled chiller was suspended for operation and under repairs.



(iv) Monthly Maximum Demand

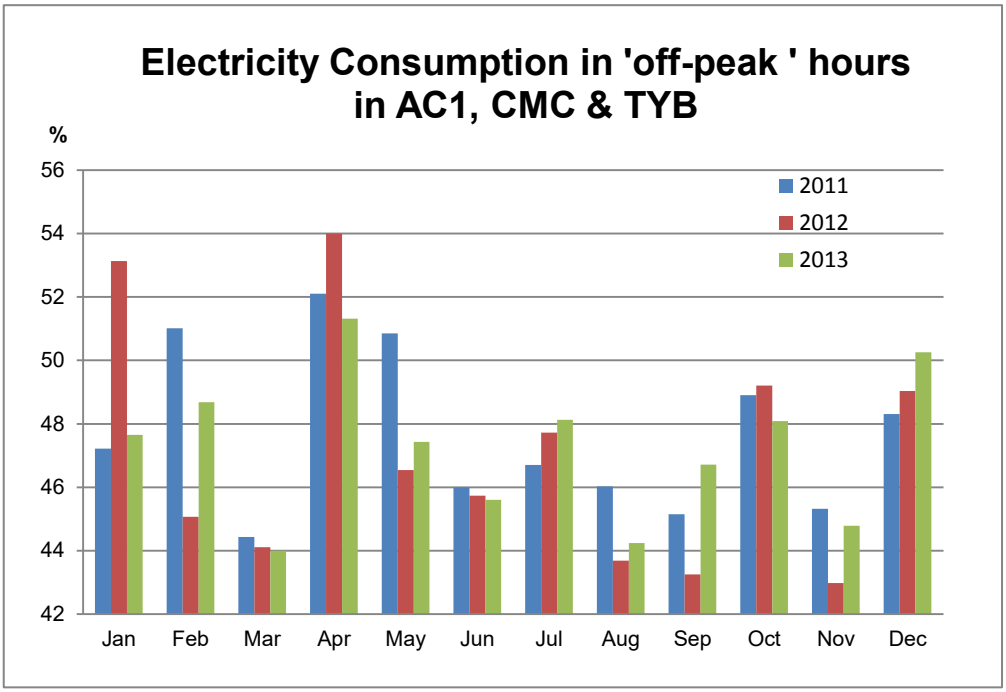
The maximum kVA demand during peak hours (i.e. 0900 to 2100 on weekdays) occurs mostly in the period between 1200 and 1600 in each month. The highest values occurred in summer months between May and September. It is because maximum kVA of the building exhibits a good correlation with the peak electrical load in chiller plant operation which in turn follows the cooling load pattern caused by the weather. Compared with year 2012, the maximum kVA decreased averagely by 2.3%. Whilst, the average load factor (unit consumed/on-peak max. demand) in AC1 decrease slightly from 437 in year 2012 to 434 in year 2013.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	7349	7170	8171	9185	9684	9764	10033	10166	10413	9152	8717	7183
2013	6860	7489	8052	8722	10136	10202	10397	9683	9794	8860	7853	6499

(v) Consumption during Off-peak Hours

Energy consumption in off-peak hours (i.e. 2100 to 0900 on weekdays and Saturday, and all hours on Sunday) maintained at a relative high percentage (47.2% in average of the total). It reveals that many campus activities continue during off-peak hours and laboratory equipment, office appliances, computer workstations, lighting and air-conditioning are kept in operation to service research activities. This phenomenon is found more pronounced in April and December.



(vi) Request for Extended Air-conditioning and Lighting Provision

Compared with that of year 2012, hours of request from user departments for additional air-conditioning and lighting services after normal hours dropped slightly by 1% in year 2013. Details of the top 10 user departments who made the most requests are shown in Appendix III.

Students' Union and AIS are the two users who made the highest number of requests on extended hour service.

5. Carbon Footprint

Since July 2008, CityU has been a signatory to the HKSAR Government's Carbon Reduction Charter and committed to carry out carbon auditing and to reduce carbon emissions in University's daily activities. We conducted campus-wide carbon audit annually with reporting on Greenhouse Gas Emissions and Removals for Buildings.

CityU supports the Energy Saving Charter (Education Sector), launched by Hong Kong Green Building Council's (HKGBC) "HK3030 Campaign" pledged to reduce electricity consumption (or equivalent carbon emission) by 30% in year 2030 (using year 2005 as the baseline).


HK3030 節能約章（教育界）
Energy Saving Charter (Education Sector)

During 2011-2013, the carbon footprint per capita on campus increased slightly from 1.247 to 1.259 largely due to the surge in number of student and staff plus energy saving in existing buildings. The total carbon footprint increased by 11% for the same period when the AC2 building commenced to use in 2013.

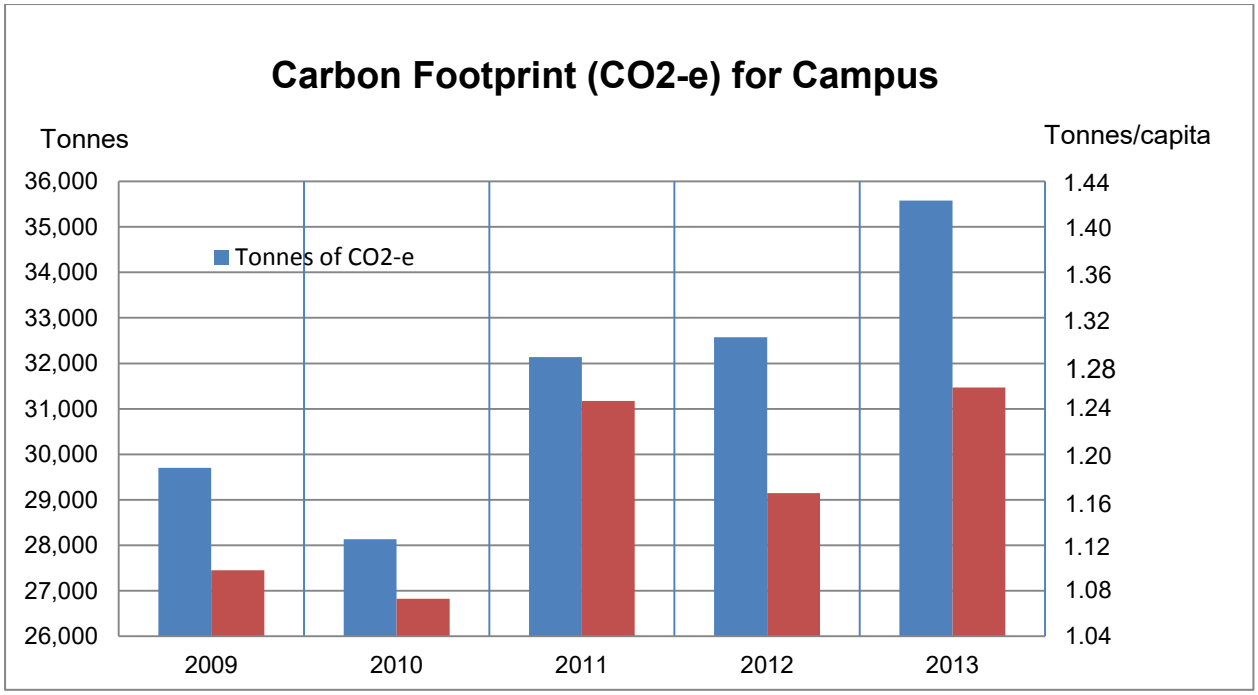
The Performance Report on GHG Emissions and Removals for year 2013 is given in ***Appendix II*** and the key performance indicators of GHG for year 2013 are :

Total GHG Emissions : 35,577 tonnes of CO_2-e
Carbon Footprint per capita : 1.259 tonnes of CO_2-e/capita

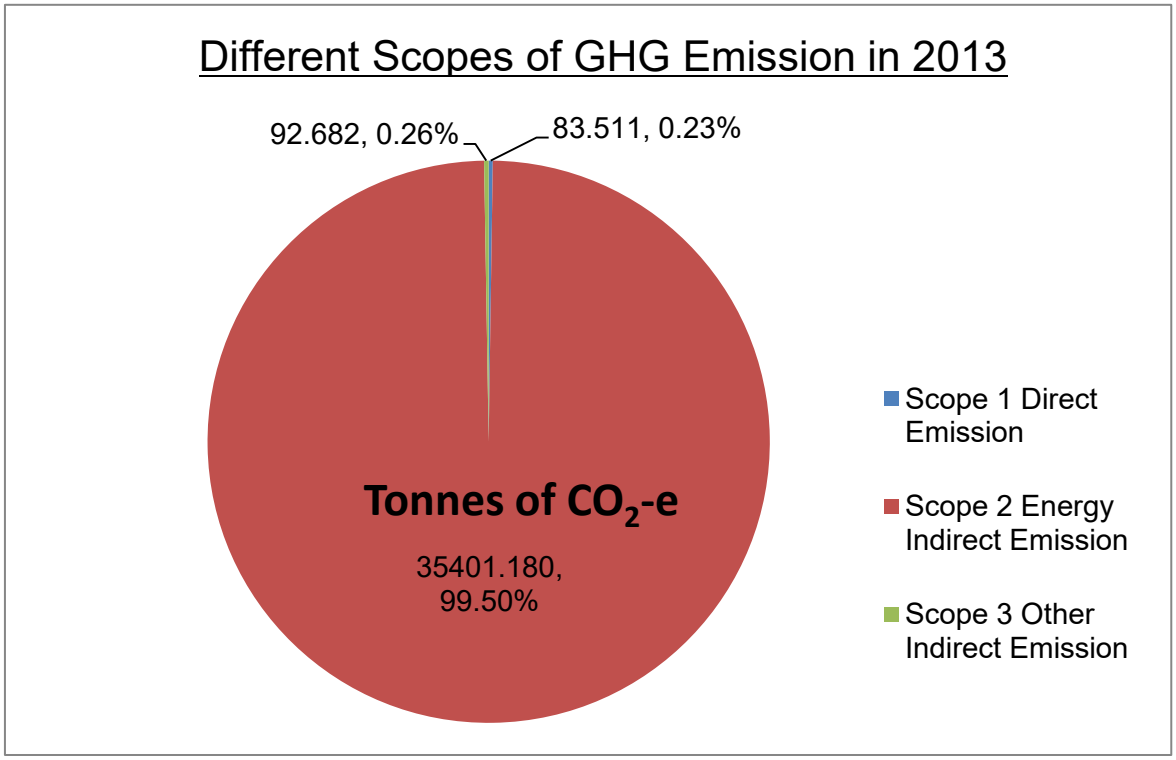
While electricity consumption contributes to over 99% of the carbon footprint on campus, carbon emission itself also depends on the carbon conversion factor of the local power supply company. This carbon conversion factor will change year to year and be dependent on the fuel mix of primary resources (e.g. natural gas, coal and nuclear etc.) used in the power generation.

CityU endeavors our best effort to increase the renewable energy installation, especially in new buildings, to offset carbon emission. In year 2013, a total renewable energy of 39,216 kWh (equivalent to 24.7 tonnes of CO_2-e) was generated annually on campus and Student Residence.

Apart from energy conservation, we continue our effort in reducing water consumption, recycling of waste water, promoting green transportation and planting additional trees so as to achieve our target of carbon foot print reduction.



	2009	2010	2011	2012	2013
Tonnes of CO_2-e	29,703.671	28,131.469	32,136.434	32,576.607	35,577.373
Tonnes of CO_2-e /capita	1.098	1.073	1.247	1.166	1.259



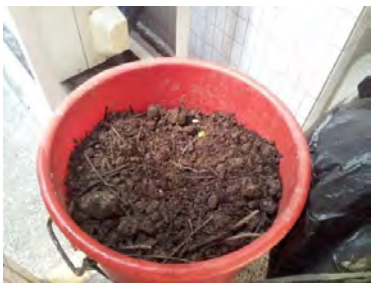
6. Campus Greening

6.1 New Initiatives

- Landscapes at the new patio adjacent to Mong Man-wai Building


- Production of leaves compost

  Composting of leaves for making fertilizers for planting work

- Use of fertilizer made from composting of food waste on the landscape in Chinese Garden (Totally, more than 150 kg of fertilizer were produced in 2013)



6.2 Improvement

- New ground covers and pebbles placed under palm trees at Chinese Garden to enhance uniformity and greenery effect

Before

After

- New creeping plants created at Nam Shan Chuen entrance to soften harsh edges of buildings

- New drip pipe system installed on roof garden of Run Run Shaw Creative Media Centre for landscape irrigation to save water and manpower

- New tree labels

  Colourful and decent new tree labels in use for better identification and image

Before

After

6.3 Event Support

Seasonal flowers provided to enrich greening atmosphere in major events such as an opening ceremony of new building

7. Green Measures and Activities in Residential Estates

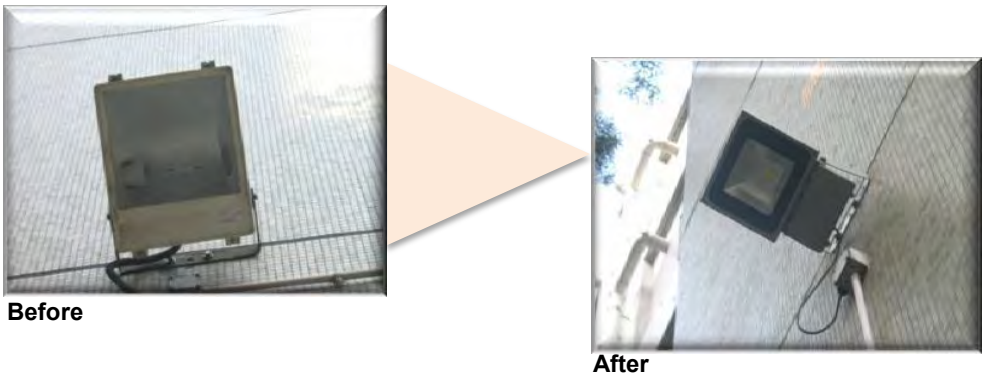
7.1 Energy Efficiency Improvement

Energy efficiency improvement continues to be implemented in the residential estates on campus and details are summarized as follows:

(a) Tak Chee Yuen

Reduced 6.0 tonnes CO_2-e per year

- 120 sets of 250W lamps installed on external walls were replaced by 70W LED energy saving lamps. A total of about 9,500 kWh of energy was saved per year.



Before

After

(b) Academic Exchange Building

Reduced 1.1 tonnes CO_2-e per year

- For visitor quarters, 60 sets of 15W table lamps were replaced with 8W LED lamp. A total of about 1,800 kWh of energy was saved last year.

Before

After

7.2 Food Waste Reduction and Recycling

Mini food decomposers were used to recycle food waste into fertilizer for residential quarters in TCY and NSY. Over 1 tonne of food waste was collected and recycled into 110 kg of fertilizer which had been applied on campus landscaping areas.

Food waste collection bin

Mini food decomposers used in TCY and NSY for recycling into fertilizer

7.3 Waste Reduction and Recycling

(a) The University participated in the Lunar Year-end Recycling Scheme (歲晚回收大行動) organized by Environmental Protection Department and invited residents in staff quarters to donate their unwanted domestic appliances for re-use.

(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 8 February 2013 to 2 March 2013, lai see packet collection boxes were placed at AC1, Student Residence, Tak Chee Yuen, Nam Shan Yuen and Academic Exchange Building to collect used lai see packets and a total of 50 kg of Lai See packets were collected for re-use.

8. Green Activities and Collaborations

We have continued sharing our expertise with the stakeholders of CityU and interested members of the public concerned with campus sustainability and related issues, supporting students' and green groups' green campaigns and participating in green promotions.

8.1 Contribution to Student Learning and Teaching

(a) Campus Sustainability Project 2013 – "Mind Your Environmental Footprint! – Ideas for Recycling Competition"

A member of CDFO, Ms Shirley Ng acted as one of the judge panel members of the above mentioned competition. Two of the winners of the competition were selected to work under the supervision of CDFO for one month to implement their winning ideas and get hand-on working experience related to environmental protection by carrying out work in tree labeling and waste audit. The waste audit covered office areas of Floor 5, 6 and 7 of AC1, Floor 4, 5 and 6 of AC2 and Floor 7 of CMC. It was revealed that about 50% of office wastes are recyclables.

(b) Internship Programme

CDFO offered the third 6-week programme to four students of BSocSc(Hons) Environmental Policy Studies of SA from 10 June to 20 July 2013 and from 8 July to 17 August 2013 to give them hand-on experience in dealing with real life environmental challenge. At the end of the programme, each student gave a presentation on their six-week learning experience.

(c) A guided tour to the PCM, genset room and main switch room of AC2 was conducted by CDFO on 25 February 2013 for a group of students of EE on a Gateway Education (GE) course.

(d) Campus Sustainability Project 2014

A meeting was conducted with a group of students of Department of Public Policy to discuss their ideas on waste recycling and reduction initiatives.

8.2 Collaboration with Others

(a) Energy Saving Charter (Education)

Attended the Hong Kong Green Building Council "HK3030 Campaign" Engagement Session on 1 February 2013 and commitment to sign the HK3030 Energy Saving Charter (Education Sector) in April 2013.

(b) Infectious Disease Prevention Campaign Cum Charter Signing Ceremony

Attended the health talk titled "豐盛關懷 健康生活" delivered as part of the Infectious Disease Prevention Campaign launched by the Fung Seng Enterprises on 19 April 2013.

(c) "惜食校園" 講座

Attended the seminar on "惜食校園" organized by the Food Education Association, Food for Good and Green Monday on 20 April 2013 to learn about 食物生命的輪迴, 綠色午餐 and 廚餘再生及處理.

(d) Guided Tour to Green Facilities of CityU

Guided tour was arranged for members of Hong Kong General Chamber of Commerce (HKGCC) to CityU's major green facilities which include green facilities at AC3, wastewater treatment facilities (e.g. Grey Water Recycling System and Electroflocculation System), roof gardens and energy saving facilities on campus.

(e) RTHK TV's Program "The Pulse"

Supported RTHK TV's program "The Pulse" by providing venue for video shooting of waste recycling facilities on campus.

(f) Environmental Protection Department of HKSAR Government

Support was given to the captioned Department of HKSAR Government by allowing them to extract information from CityU website and to introduce CityU's food waste reduction activities and achievements to the public.

(g) Engagement on Municipal Solid Waste Charging by the Council for Sustainable Development

As a supporting organization of the captioned event, CityU actively conducted the activities / events listed below:

- To put up posters of "Waste Reduction by Waste Charging – How to Implement" on campus notice boards to urge public participation.
- To assist in organizing a briefing session on "Waste Reduction by Waste Charging. How to Implement?" on campus.
- To assist in holding a display on "Waste Reduction by Waste Charging. How to Implement?" on campus.

(h) Sino Group of Hotels

In response to the enquiry received from the captioned hotel on our transparent recycle bins, detailed information was provided to them.

(i) Wood Recycling & Tree Conservation Scheme

The University participated in the Wood Recycling & Tree Conservation Scheme (木材回收樹木保育計劃) offered by the Hong Kong Environmental Protection Association and sent spent seasonal flowers used in Lunar New Year for recycling to fertilizer which is given to schools in Hong Kong for greening work.

8.3 Enhancing Community Awareness

(a) WWF "Earth Hour 2013"

CityU supported, as always, the captioned campaign held on the 23 March 2013 by turning off non-essential lights in corridors, open / roof gardens, carparks and / or external / public areas at AC1, Administration Buildings, Amenities Building, AC2, AC3 and CMC for one hour from 8:30pm to 9:30pm.

In addition, City Announcement Portals (CAPs) were also issued to all staff and students of CityU 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.

(b) **"World Environment Day (WED) 2013 – Love Food Waste Not " Video Filming Competition**

A CAP was issued to encourage CityU's students to participate in the "World Environment Day 2013" video filming competition and to attend celebration activities of WED 2013. The aim of the Competition is to encourage students to take action on and promote food waste reduction.

(c) **"Zero Food Waste in CityU" Programme**

Our 18-month "Zero Food Waste in CityU" programme launched in early 2012 and orchestrated by representatives from Student Development Services (SDS), Student Residence Office (SRO), Finance Office (FO), CDFO and Greeners Action was continued to hold activities to promote food waste reduction in CityU, which include Food Waste Reduction and Recycling Sharing Session on 23 April 2013, Food Waste Reduction Sharing Forum for Administration staff on 24 July 2013, etc.

(d) **Hong Kong No Air-Con Night 香港無冷氣夜 2013**

The captioned campaign organized by the Green Sense on 26 September 2013 was a 12-hour-long air-conditioning out action starting from 7:00 p.m. 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 (LTs), Library, Hu Fa Kuang Sports Centre, canteens and Wei Hing Theatre in AC1, LTs, canteen and public areas in AC2, and LTs in CMC – to 25°C to lower power consumption. Air-conditioning to U-Concourse in AC1, Floor 5 corridor and City Express in AC1 were also shut off.

9. Recognitions and Awards

The following recognitions and awards were received that honoured our efforts in creating a low-carbon campus. We will continue to strive for better performance in the years to come.

9.1 ISO 14001 : 2004 Certification

To demonstrate a collective commitment to manage our operations and services in an environmentally responsible manner, CDFO adopted and implemented an Environmental Management System (EMS) to monitor and control our environmental impacts risks. Our EMS is certified in compliance with ISO 14001 standard for the 12th year.


bsi.
Certificate of Registration
ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2004
City University of Hong Kong
Campus Development and Facilities Office
83 Tat Chee Avenue
Kowloon
Hong Kong
EMS 579703
...making excellence a habit.

9.2 Certificate of Fresh Water Plumbing Quality Maintenance Recognition Scheme

We are granted with Gold certificate for the fourth year to appreciate our efforts in achieving the prescribed requirements of the Fresh Water Plumbing Quality Maintenance Scheme of the Water Supplies Department of the HKSAR Government by maintaining good water quality to the University community through proper maintenance of water tanks, pumps and water pipework in buildings, satisfying.

9.3 Wastewi$e Label of the Hong Kong Awards for Environmental Excellence

To recognize CDFO that has demonstrated all-round and outstanding achievements in environmental performance, "Class of Excellence" Wastewi$e Label was awarded for the eleventh consecutive years.

9.4 Wood Recycling & Tree Conservation Scheme

The CityU was awarded a Certificate by the Hong Kong Environmental Protection Association for recognizing us as Hong Kong's first honours support organizations of the Scheme.

9.5 Building Environment Assessment Method (BEAM)

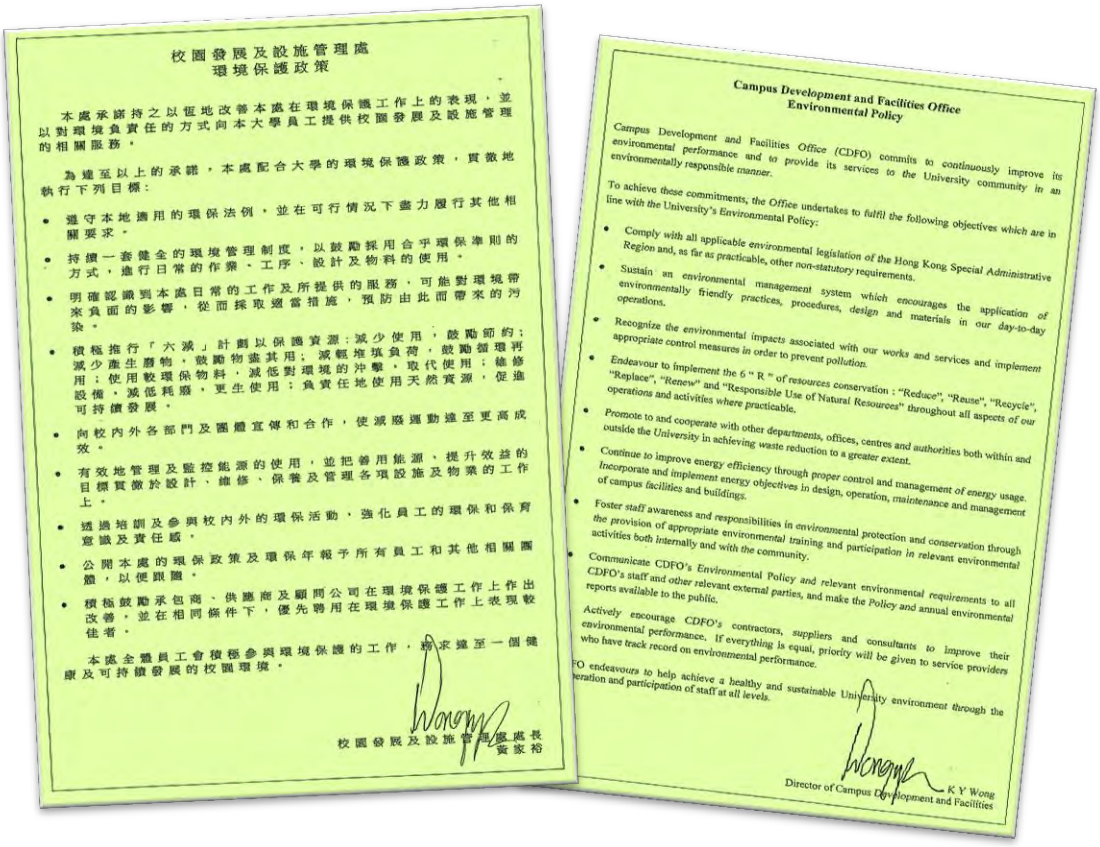
Academic 3 achieved the rating of Gold Standard of the Beam.

The Practices / Initiatives Exemplifying CDFO's Commitment and Inspirational to the University Community

We firmly believe that the choices and actions of a department can make a difference when helping create a sustainable campus. Throughout the years, we have actively promoted a number of green initiatives within the Office. Some of which are highlighted below:

Environmental Policy

CDFO has its own Environmental Policy since 2001 that reflects our values.



校園發展及設施管理處
環境保護政策

本處承諾持之以恆地改善本處在環境保護工作上的表現，並以對環境負責任的方式向本大學員工提供校園發展及設施管理的相關服務。

為達至以上的承諾，本處配合大學的環境保護政策，貫徹地執行下列目標：

- 遵守本地適用的環保法例，並在可行情況下盡力履行其他相關要求。
- 持續一套健全的環境管理制度，以鼓勵採用合乎環保準則的方式，進行日常的作業、工序、設計及物料的使用。
- 明確認識到本處日常的工作及所提供的服務，可能對環境帶來負面的影響，從而採取適當措施，預防由此而帶來的污染。
- 積極推行「六減」計劃以保護資源：減少使用，鼓勵節約；減少產生廢物，鼓勵物盡其用；減輕堆填負荷，鼓勵循環再用；使用較環保物料，減低對環境的沖擊，取代使用；維修設備，減低耗廢，更生使用；負責任地使用天然資源，促進可持續發展。
- 向校內外各部門及團體宣傳和合作，使減廢運動達至更高成效。
- 有效地管理及監控能源的使用，並把善用能源、提升效益的目標貫徹於設計、維修、保養及管理各項設施及物業的工作上。
- 透過培訓及參與校內外的環保活動，強化員工的環保和保育意識及責任感。
- 公開本處的環保政策及環保年報予所有員工和其他相關團體，以便跟進。
- 積極鼓勵承包商、供應商及顧問公司在環境保護工作上作出改善，並在相同條件下，優先聘用在環境保護工作上表現較佳者。

本處全體員工會積極參與環境保護的工作，務求達至一個健康及可持續發展的校園環境。

校園發展及設施管理處處長
黃家裕

Campus Development and Facilities Office
Environmental Policy

Campus Development and Facilities Office (CDFO) commits to continuously improve its environmental performance and to provide its services to the University community in an environmentally responsible manner.

To achieve these commitments, the Office undertakes to fulfil the following objectives which are in line with the University's Environmental Policy:

- Comply with all applicable environmental legislation of the Hong Kong Special Administrative Region and, as far as practicable, other non-statutory requirements.
- Sustain an environmental management system which encourages the application of environmentally friendly practices, procedures, design and materials in our day-to-day operations.
- Recognize the environmental impacts associated with our works and services and implement appropriate control measures in order to prevent pollution.
- Endeavour to implement the 6 "R" of resources conservation : "Reduce", "Reuse", "Recycle", "Replace", "Renew" and "Responsible Use of Natural Resources" throughout all aspects of our operations and activities where practicable.
- Promote to and cooperate with other departments, offices, centres and authorities both within and outside the University in achieving waste reduction to a greater extent.
- Continue to improve energy efficiency through proper control and management of energy usage. Incorporate and implement energy objectives in design, operation, maintenance and management of campus facilities and buildings.
- Foster staff awareness and responsibilities in environmental protection and conservation through the provision of appropriate environmental training and participation in relevant environmental activities both internally and with the community.
- Communicate CDFO's Environmental Policy and relevant environmental requirements to all CDFO's staff and other relevant external parties, and make the Policy and annual environmental reports available to the public.
- Actively encourage CDFO's contractors, suppliers and consultants to improve their environmental performance. If everything is equal, priority will be given to service providers who have track record on environmental performance.

FO endeavours to help achieve a healthy and sustainable University environment through the eration and participation of staff at all levels.

K Y Wong
Director of Campus Development and Facilities

Green Staff

An understanding of and commitment to sustainability are integrated into our new staff induction training. Since environmental initiative is one of the performance goals in our Performance-based Pay Review, the annual performance of all staff members is partly evaluated on the basis of their contributions to CityU's sustainability efforts. Every staff member of CDFO contributes their part of green effort.

No Bottled Water

CDFO recognizes bottled water is unsustainable from the perspectives of energy, resource, finance and health concerns. Therefore, we serve tap water for meeting use rather than bottled water. Additionally, we facilitate the University community to use filtered, ultra-violet light disinfected tap water at drinking fountains throughout the campus which are so as to give environmentally conscious students an option and hence to reduce the amount of bottled water consumed as well as the related trash.

Various drinking fountains in different parts of Campus

Recycled of Food Waste

CDFO encourages our staff members, who bring their own lunch to work, to recycle food waste to fertilizer using the organic waste decomposer provided for Senior Staff Quarters.

Use of Recycled Paper

The proportion of recycled paper of 100% recycled content being used in CDFO is on the increase since we recognize recycled papers save our valuable resources, save energy, create less water and air pollution, and help our over-crowded landfills.

Energy Conservation

We use 36 administrative and operational means to cut down energy consumption on campus to save costs / money. Some of the examples are :

1.) Use of Building Management System to reduce the operating time of equipment.

2.) Deletion of the operation of equipment (such as lighting) that are over-provisioned or non-value added.

3.) Maximization of the use of water-cooled chillers by re-arranging the operation of water control valves.

Green Purchasing

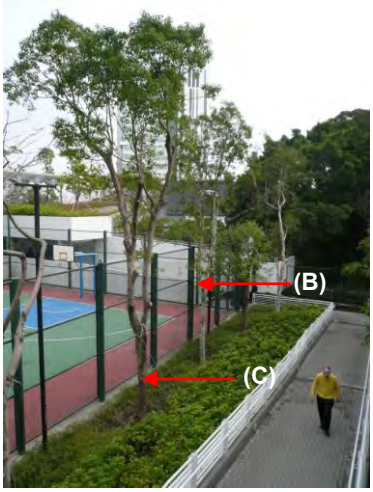
As university can be seen as a major purchaser of goods and services, we promote sustainable practices to and support our contractors to have more respect to the environment by separating construction waste for use and recycle, separating domestic waste from industrial waste, covering skip with tarpaulin to avoid contamination of storm drain when raining, minimizing construction noise, and using green cleaning materials.

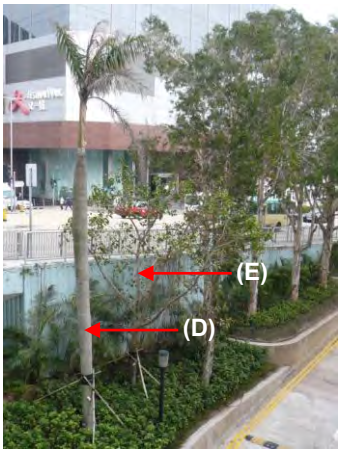
Minimization of Waste

In an attempt to eliminate wastefulness as far as possible and turn waste into a new materials that again gets consumed, we seek ways to reduce the amount of waste we generate and follow a “cradle-to-cradle” process exemplified in the natural world. We repurpose unwanted furniture items disposed of by departments, reuse salvaged furniture / fixtures / building materials / AV equipment in renovation works, and repair engineering parts / items for reuse. We even reduce and also urge departments to reduce number of rubbish bins being used with a view to encourage less generation of solid waste.

Tree Preservation and Protection

We put substantial efforts in transplanting trees affected by construction activities. On the enhancement of practices on tree management, we perform regular tree risk assessment.





Transplanted (A) Ficus microcarpa (細葉榕), (B) Melalenca cajuputia (白千層), (C) Cinnamomum camphora (樟樹), (D) Roystonea regia (王棕), (E)Ficus religiosa (菩提樹) and (F) Cinnamomum camphora (樟樹) prospering at their new setting

The Sustainable Way Forward

In 2013, we have already materialized our saving 7.5% of energy consumption (year-to-year) using 2011 as the baseline which is ahead of our target of 6% saving. However, we will commit to challenging ourselves in making continuous environmental improvement.

CDFO exemplifies CityU's commitment and will continue to play a key role in confronting issues of sustainability on campus. We hope our effort is inspirational to students, faculty and staff.

The Road to a Sustainable Campus : Past 13 years' Commitment to Sustainability

CDFO has taken a leading role to help create a sustainable campus in a university of constrained resources. Significant achievements of each year from 2001 to 2013 are highlighted.

2001

Environmental Policy of CityU formulated

2002

An environmental management system to ISO14001 standard implemented

"Free air cooling" used in Hu Fa Kuang Sports Centre

2003

Campus-wide energy audit conducted

Green campus tour conducted for secondary school

Spent mobile phone batteries and **expanded polystyrene** collected and recycled

Solar film applied to glass windows of classrooms facing west to cut down solar heat gain

2004

Water-to water heat pump installed for hot water supply to showers in Hu Fa Kuang Sports Centre to save energy

Two **electroflocculation systems** installed to treat wastewater generated from catering outlets

CDs / DVDs / VCDs collected and recycled

2005

Energy efficient T-5 to replace T-8

Capacitor bank installed to power distribution system to enhance the power factor in electrical distribution system

LED lamps to replace exit signs

Auto-stop faucets installed to save water in toilets

2006
2007

Energy efficient water-cooled chillers to replace air-cooled ones

Occupancy-sensors used to turn off lightings in staff toilets when toilets not in use

The **"Desert Cube Waterless Urinal System"** adopted in some male toilets to save flushing water

Recycled bricks used for paving

Defective electronic ballasts repaired and reused

2008

Performance report on greenhouse gas / carbon reduction published

Hybrid renewable energy powered lamp pole installed

Recycle grey water used for irrigation

Environmentally friendly car used as university pool cars

Green roof created on Campus

Trial run carried out to **compost food waste** to make fertilizer

2009

"Vacuum-type" solar panels installed for supply hot shower water for Hu Fa Kuang Sports Centre

Phase-change-materials thermal storage system installed to chill water at night during non-peak hours, which will be used during the day for cooling

2010

Trial **use of discarded pool water** for irrigation

Dismantled building materials and fixtures reused in renovation works

Web-based power management system installed to monitor energy usage pattern and power quality in energy management

2011

Internship programme provided

Passenger lifts upgraded **with energy efficient P-M motors**

Weekly Campus Earth Hour implemented

An **electric vehicle** used as university pool car to reduce roadside pollution

Food waste collected and **recycled into fish feed**

Glass bottles collected and recycled

QR code established to facilitate self-guided touring of campus environmentally friendly facilities

Photovoltaic panels installed to generate electricity with grid-connection at Student Residence

2012

Used furniture reused in renovation works

"Zero Food Waste in CityU" launched

Rainwater harvesting system installed

2013

Energy efficient air-conditioning system using "hot & cold" aisles method built for the Data Centre

Air-to-air heat exchanger used for heat recovery in fume extraction system

Food waste reduction sharing session conducted for administration staff

Use of **carpet tiles with recyclable face fiber**

Environmental Achievement

Green Building

Year 2012

- Academic 3 wins a Merit Award in the Green Building Award 2012

Year 2012

- Run Run Shaw Creative Media Centre wins the China Green Building Council's Green Building Design Label 2-Star

Year 2012

- AC2 achieved the rating of Gold standard of the BEAM

Water

Year 2010

- Win a Gold Certificate for our dedication to maintain good potable water quality

Electricity

Year 2010

- Win the award of "Champion of the Biggest Unit Saver"

Year 2006

- Win the Pioneer Award and Merit Award in the HK Energy Efficiency Awards

Solid Waste

Year 2003

- Earn a Wastewi$e Scheme Gold Logo

Year 2012

- Receive Gold Award for our achievements in waste reduction and recycling over the past few years

Year 2011

- Receive "Bronze Award" for our consistent effort in carrying out waste separation and recovery arrangements

Food Waste

Year 2012

- Receive Appreciation Certificate of the "Love Food Waste Not" Summit for our sustainable contribution towards source separation of waste

Appendix I

Appendix I

2013 Environmental Performance Indicators

According to the reporting protocol of GRI (General Reporting Initiative) guidelines, our environment performance indicators for the aspects of energy, water and emissions/discharges in year 2013 are summarized as follows :

Resource Consumption

- *Electricity use = 60,878MWh*
- *Towngas use = 7,536MJ*
- *Petrol / diesel use = 22,139 litres*
- *Potable water use = 164,300 m^3*

Emissions / Discharges

- *Wastewater discharge = 151,950 m^3*
- *Waste potable water recycled for irrigation = 2,446 m^3*
- *Net Greenhouse gas emission = 38,534 tonnes CO_2 equivalent*
- *Office & domestic waste generation = 1,546 tonnes*
- *Office & domestic waste disposal = 1,172 tonnes*
- *Office & domestic waste recycling (including food waste) = 374 tonnes*
- *% of waste disposal of in landfill = 76 % of waste generation (i.e. 24 % recycled)*

Key Eco-efficiency Ratios *[2]*

- *% change in electricity use per capita = 3.66% increase*
- *% change in electricity use per m2 = 11.45% reduction*
- *% change in water use per capita = 7.6 % reduction*
- *% change in petrol / diesel use = 8.8 % reduction (7.2%)*

Note:

1) *The calculation of above-mentioned performance data is based on all buildings on main campus (viz, AC1, CMC, TYB, AC2 & AC3);*
2) *The percentage change calculation is based on the comparison of environmental performance data between year 2013 & year 2012;*
3) *In year 2013, one new building, Academic 3, was completed for operation. The performance data of Academic 3 is included for the above-mentioned calculations.*

Appendix II

Appendix II

Performance Report

on

Greenhouse Gas (GHG) /

Carbon Reduction

for

City University of Hong Kong Campus

2013

1. Reporting Entity

This is the Performance Report on Greenhouse Gas (GHG) / Carbon Reduction for City University of Hong Kong (CityU) Campus 2013 prepared by the Campus Development Facilities Office, City University of Hong Kong.

2. Campus Development Facilities Office (CDFO)

The CDFO is 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 CDFO. CDFO 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 January to 31 December 2013.

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:

- Academic 1, Administration Buildings, Sports Complex, Amenities Building and Academic 2 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 (CMC) within the Site Lot at 18 Tat Hong Avenue, Kowloon Tong.

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

- Academic 1: 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.
- Sports Complex and Amenities Building: sports halls, student activities rooms, exhibition rooms, health centre, canteen, restaurants, and offices.
- Academic 2: offices, lecture theatres, classrooms, computer rooms, plant rooms and machine rooms.
- 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)**
Academic 1, Administration Buildings, Sports Complex and Amenities Building	159,471
Academic 2	38,969
To Yuen Building	6,638
Run Run Shaw Creative Media Centre	23,749

(d) The Academic Exchange Building, Academic 3, 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).
- Towngas purchased from the Hong Kong and China Gas Company (HKCG).

c) Scope 3 (Other Indirect Emissions) Activities

- Methane gas generation at landfill due to disposal of paper waste
- GHG emissions due to electricity used for fresh water processing by Water Supplies Department (WSD)
- 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 Water Supplies Department 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) A 3-year (2012-2014) Plan was formulated to reduce the annual carbon emission by 6% by end of year 2014, using the emissions in year 2011 as the 'baseline'. A campus-wide energy audit has been conducted and completed in March 2011.

(d) 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.

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

10. Contact Persons

This report was prepared by the CDFO of the University. Any queries or suggestions can be directed to Mr. P.K. Chan at 3442 6908 or Mr. Tony Tung at 3442 6850 or write to fmwork@cityu.edu.hk.

Summary Table on Greenhouse Gas (GHG) Emissions and Removal
for Campus of City University of Hong Kong for 2013

Updated : 21 Mar 2014

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	1.0764452	0.000206682	0.000944669	**N/A**	**N/A**	1.078
Dehumidifier in CS laboratory	0.400193	0.000147046	0.000481833	**N/A**	**N/A**	0.401
Mobile Combustion Sources						
Vehicle	49.75902882	0.079636774	5.051430805	**N/A**	**N/A**	54.890
Fugitive Emissions						
Refrigerant used in A/C plant	**N/A**	**N/A**	**N/A**	35.554		35.554
Other Direct Emissions						
NIL						0.000
Scope 1 Emissions Total	51.23566702	0.079990503	5.052857307	35.554		***91.923***
Scope 1 Direct Removals						
Planting of Additional Trees based on year 2007						
Campus	-2.622	**N/A**	**N/A**	**N/A**	**N/A**	-2.622
Other Direct Removals						
Wind & solar light tower	0.054					0.054
Vacuum tube solar panel for shower	10.98					10.980
Scope 1 Removals Total	8.412	0	0	0	0	***8.412***
Scope 2 Energy Indirect Emission (To be reported in general without being classified into specific gas type)						
Electricity Purchased						
Campus						35,401.087
Towngas Purchased						
Campus						0.093
Scope 2 Emission Total						***35,401.180***
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						65.935
Electricity for Processing Sewage (To be reported in general without being classified into specfic gas type)						
Campus						26.747
Others						
NIL						0.000
Scope 3 Emissions Total						***92.682***
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		754.0728				***754.073***
Off-site GHG Reduction Projects outside Hong Kong						
NIL						***0.000***

Summary of Results

Total Scope 1 Emissions :	**91.923**	Tonnes of CO_2-e
Total Scope 1 Removals :	**8.412**	Tonnes of CO_2-e
Total Scope 2 Emissions :	**35,401.180**	Tonnes of CO_2-e
Total Scope 3 Emissions :	**92.682**	Tonnes of CO_2-e
Total other GHG Offsets / Removals :	**754.073**	Tonnes of CO_2-e
Total Net GHG Emissions :	**35,577.373**	Tonnes of CO_2-e
GHG Performance in Ratio Indicator :	**1.259**	Tonnes of CO_2-e / person
	0.155	Tonnes of CO_2-e / m^2

Table 1 : GHG Emissions from Stationary Sources for 2013

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 Standby-generator	116	litre	diesel oil	2.614	0.303224	0.0239	5.82204E-05	0.0074	0.000266104
CMC Standby-generator	159.8	litre	diesel oil	2.614	0.4177172	0.0239	8.02036E-05	0.0074	0.000366581
AC2 Standby-generator	136	litre	diesel oil	2.614	0.355504	0.0239	6.82584E-05	0.0074	0.000311984
Dehumidifier for CS Laboratory at Floor 2, Administration Building	157	48MJ	Towngas	2.815	0.441955	0.0446	0.000147046	0.0099	0.000481833
Total					**1.5184002**		**0.000353729**		**0.001426502**

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

Table 2 : GHG Emissions from the Mobile Sources for 2013

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.)								
MH4999 passenger car	1625.41	petrol	2.36	3.836	0.253	0.009	1.105	0.557
LY7643 passenger car	1685.95	petrol	2.36	3.979	0.253	0.009	1.105	0.578
FL8988 passenger car	2066.83	petrol	2.36	4.878	0.253	0.011	1.105	0.708
MU6235 passenger car	2119.05	petrol	2.36	5.001	0.253	0.011	1.105	0.726
KP8936 passenger car	1276.67	petrol	2.36	3.013	0.253	0.007	1.105	0.437
FY880 passenger car	1936.55	petrol	2.36	4.570	0.253	0.010	1.105	0.663
JW7858 passenger car	1215.98	petrol	2.36	2.870	0.253	0.006	1.105	0.417
GG7750 medium goods vehicle	2459.45	diesel oil	2.614	6.429	0.145	0.007	0.072	0.055
HS783 (Nissan) van	2457.54	diesel oil	2.614	6.424	0.072	0.004	0.506	0.385
EK1983(Hiace) van	1480.73	diesel oil	2.614	3.871	0.072	0.002	0.506	0.232
RU5133 van	1870.31	diesel oil	2.614	4.889	0.072	0.003	0.506	0.293
Navigation								
NIL								
Aviation								
NIL								
Total				**49.759**		**0.080**		**5.051**

Table 3 : HFC and PFC Emissions from Refrigeration / Air-conditioning Equipment (Operation Process) for 2013

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	18	81	10	13	0	0
R407C	9	0	0	5	1526	6.104
R410A	0	22	10	10	1725	3.45
R134a	0	40	8	12	1300	26
Total						**35.554**

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 2013

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	8	122	23	-2.622
Total				**-2.622**

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 2007.

Table 5 : GHG Emissions from Electricity Purchased from Power Companies for 2013

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	43,523,348	0.63	0.7	27,419.709	30466.3436
Creative Multimedia Centre	5,123,499	0.63	0.7	3,227.804	3586.4493
To Yuen Building	1,215,968	0.63	0.7	766.060	851.1776
Academic 2	6,329,387	0.63	0.7	3,987.514	4430.5709
Total				**35,401.087**	**39334.5414**

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

The Power company specific emission factor 0.63 is extracted from CLP Substantiability Report 2013.

Table 6 : GHG Emissions from Towngas Purchased from the Hong Kong and China Gas Company for 2013

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)
Dehumidifier for CS Laboratory at Floor 2, Administration Building	157	0.595	0.093
Total			**0.093**

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.

Table 7 : Methane Generation at Landfill in Hong Kong due to Disposal of Paper Waste for 2013

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	157098.5 Note 2		0	4.8	-754.0728
Total						**-754.0728**

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 2013

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 / m^3) Note	Emission in tonnes of CO_2 equivalent (B x C / 1000)
Academic 1, Administration Building, Amenities Building and Sport Complex	137781	0.424	58.419
Creative Multimedia Centre	1647	0.424	0.698
To Yuen Building	578	0.424	0.245
Academic 2	15501	0.424	6.572
Total			**65.935**

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 2013

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, Administration Building, Amenities Building and Sport Complex	137781	0.172	23.698
Creative Multimedia Centre	1647	0.172	0.283
To Yuen Building	578	0.172	0.099
Academic 2	15501	0.172	2.666
Total			**26.747**

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.

Appendix III

Appendix III

Top Ten Departments Making the Most Requests for Additional Air-conditioning and Lighting Provisions

Rank	2011			2012			2013		
	Department	Total number of service requests	Total hours extended	Department	Total number of service requests	Total hours extended	Department	Total number of service requests	Total hours extended
1	SU	108	930.3	SU	378	3147.0	SU	484	3832.7
2	EE	200	749.8	EE	263	1354.1	AIS	263	1260.6
3	EF	162	565.0	MA	120	963.4	SS	275	946.1
4	SS	159	477.3	SS	173	754.0	MBE	214	918.0
5	SLW	188	455.4	MS	203	753.4	EF	128	851.7
6	MA	45	336.0	CS	173	720.9	MS	224	829.6
7	AC	91	318.8	EF	118	690.1	EE	162	544.4
8	CTL	84	283.2	SLW	176	567.2	CS	112	427.1
9	CS	53	271.1	MBE	108	546.9	MGT	92	278.3
10	MS	84	233.2	SA	75	723.6	SLW	150	250.3
Total number of hours extended for the year	4,620.1			10,220.6			10,138.8		
Total number of service requests for the year	1,174.0			1,787.0			2,104.0		
The month of highest extended hours	October			November			October		