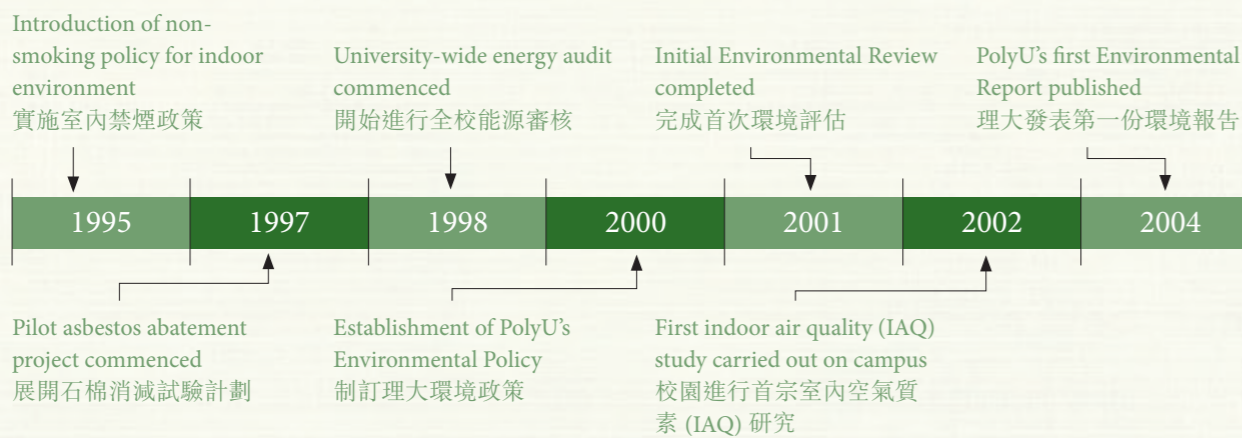


Sustainable Campus 可持續校園



Sustainable Campus 可持續校園

At PolyU, we have included 'Sustainability' as a strategic focus for the campus development. Being one of the leading tertiary institutions in Hong Kong, we are environmentally responsible and drive to sustainability. Therefore, we have undertaken initiatives to encourage environmentally-conscious practices on campus to reduce our environmental footprint. Through carrying out our core functions of teaching and research, the University is also committed to nurturing a sustainable culture in the society through education and technology innovations.

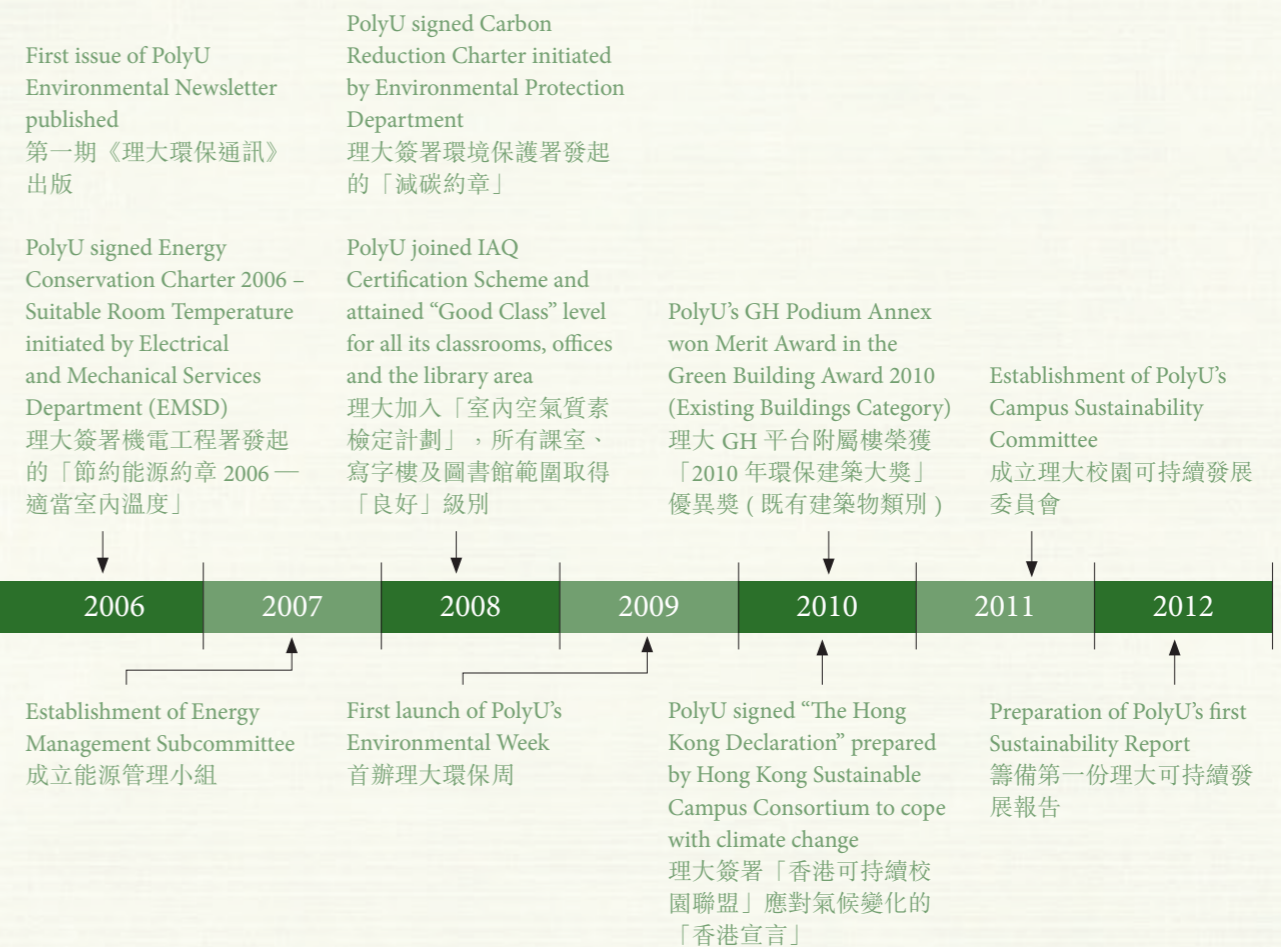
理大將「可持續發展」定為校園發展的策略性重點。作為香港主要的專上學院之一，我們致力愛護環境，努力實現和推廣可持續發展。為此，我們推出不同計劃在校園提倡環保實踐，藉此減低我們的環境足印。此外，在教學及研究這兩個核心功能領域，校方亦倡領可持續發展，旨在透過教育和技術創新培育相關的文化。

Our Journey towards a Sustainable Campus

邁向可持續發展校園

The following timeline highlights our initiatives and efforts in building a sustainable environment at campus since 1995.

以下大事年誌列出 1995 年至今理大在校園可持續環境發展上的重要里程碑。



To develop and maintain a functional, attractive, sustainable and community-linked campus in support of the University's core mission in learning, teaching and research.”

「不斷建設功能完備、優美宜人、可持續發展並與社區緊密連繫的校園，支持本校實現學習、教學及研究三方面的核心使命。」

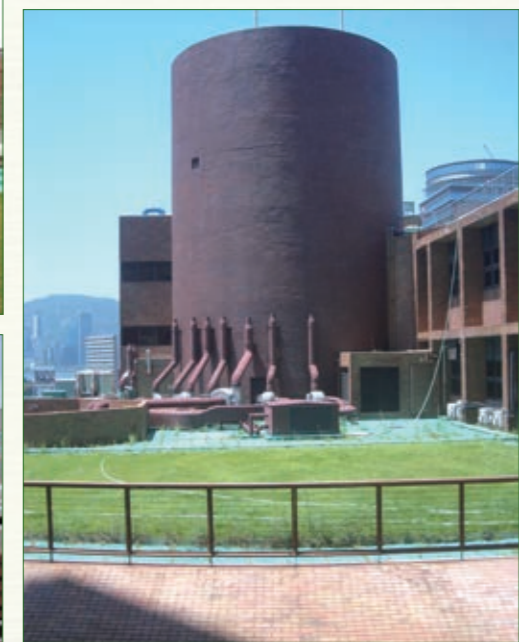
– Our Overarching Aim for Campus Development
我們的校園發展總體目標

Campus Greenery

PolyU is located in the busy town centre, nevertheless greenery can be seen everywhere. Our main campus has about 1.9 hectares of planted area with about 550 trees and over 10,000 shrubs, covering one fifth of the total campus area. Green roofs were installed on three buildings, with a sum of 1,800 square meters. To maintain such a green environment, we make every effort to proactively preserve and protect the trees during all campus developments.

校園綠化

理大雖然位處繁忙市區，但校園綠蔭處處，環境宜人。我們的主校園約有 1.9 公頃綠化面積，種有 550 株樹木和逾 10,000 株灌木，佔校園總面積五分之一。現時共有三座樓宇建有綠化屋頂，覆蓋範圍達 1,800 平方米。為維持優美舒適的綠化環境，我們在發展校園的同時也積極推行樹木保護和保育工作。



Greenery Everywhere on the Campus
校園綠化環境比目皆是

At PolyU, we have been striving to incorporate more greenery in new development projects, for example the Phase 8 Development, Student Hostel Phase 3 and the proposed Library Extension/revitalization Project. Besides providing a number of teaching and research facilities, these new buildings make use of natural lighting and ventilation where applicable to help maintaining a comfortable indoor environment for users, while providing a pleasant setting to encourage interaction between people and the nature.

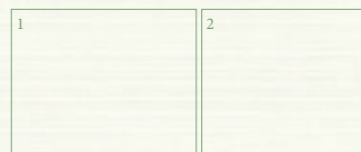
我們致力在所有校園新發展項目加入更多綠化元素，包括第八期發展項目、學生宿舍第三期及計劃中的圖書館擴建/活化項目。除了提供多項教學及研究設施，這些新大樓還盡量利用天然採光和通風，為使用者創造宜人環境，促進人與大自然協調融和。



Phase 8 Development - Public Open Space and Green Area on Ground & Upper Floors
第八期發展項目 — 地下及上層公眾休憩用地及綠化地方



Student Hostel Phase 3
學生宿舍第三期



1. Revised Design for Entrance Plaza
經修改的入口廣場設計
2. Sky Garden
空中花園



Proposed Library Extension/Revitalization Project
建議的圖書館擴建/活化計劃



1. Atrium View – Podium Floor to Skylight
中庭外貌 — 平台層至玻璃頂
2. 6/F Interior – Clerestory and Greenwall
六樓內部 — 天窗及綠化牆
(上：綠色平台、間接採光、北天窗、綠化牆；下：開放透明式流通中心)

We make use of each opportunity in applying green building materials on campus. One renowned example is the application of Eco-block for road pavement within the campus. Developed by the Department of Civil and Environmental Engineering (formerly, Department of Civil and Structural Engineering), the major constituents of the Eco-block are recycled glass and construction wastes. It also has a de-polluting feature that is able to remove air pollutants through photo-catalytic reactions. The pilot testing was conducted on PolyU campus over ten years ago. Today, this environmentally friendly construction material has been commercialized and widely adopted in Hong Kong.

建材方面，在情況許可下，我們的校園工程會優先選用環保建材，其中一個廣為人知的實例是校園內行人路鋪設環保磚。這種地磚由土木及環境工程學系（前稱：土木及結構工程學系）研發，主要成份是回收再造玻璃及建築廢料，廢物利用之餘還可透過光催化作用清除空氣污染物。理大早於十多年前便在校園展開試驗計劃，現在這種環保建材在香港各處可見，廣泛作商業用途。

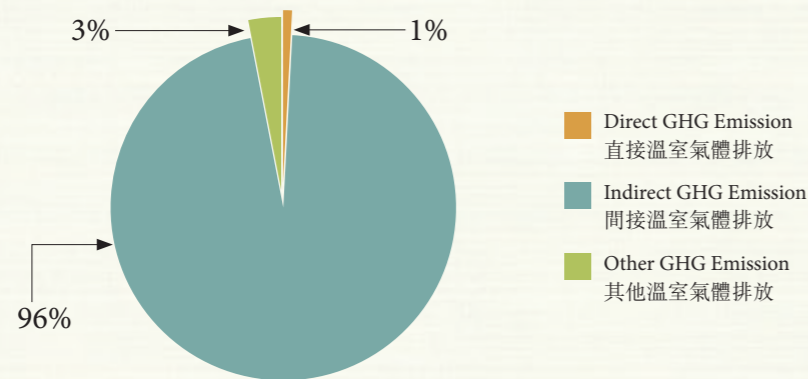


Eco-block Applied in Road Pavement on PolyU Campus
理大校園的行人通道鋪設環保磚

Carbon Emission

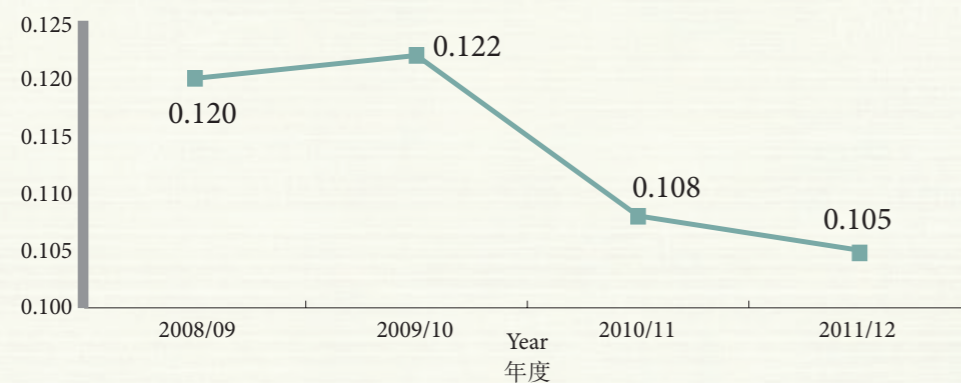
In response to the challenges of climate change, PolyU signed the “Carbon Reduction Charter” launched by EPD and “The Hong Kong Declaration” prepared by the Hong Kong Sustainable Campus Consortium in 2008 and 2010 respectively. To formulate carbon reduction plans, we have taken the first step to understand our carbon footprint through conducting carbon audit for our premises on an annual basis. In 2011/12, our total carbon emission was about 46,500 tonnes of carbon dioxide equivalent. Among all, about 96% emission came from various energy indirect emission sources such as electricity and town gas. We have reduced our carbon emission per Gross Floor Area (GFA)¹ in two consecutive years by around 14%, down to 0.105 tonnes of CO₂-e/m² in 2011/12.

Carbon Emission by Type in 2011/12 (in tonnes of CO₂-e)
2011/12 年度主要碳排放種類 (以公噸二氧化碳當量計)



Carbon Emission per GFA¹ during 2008/09-2011/12 (in tonnes of CO₂-e/m²)
2008/09 至 2011/12 年度以樓面總面積¹計算的碳排放量 (以公噸二氧化碳當量/平方米計)

Carbon Emission (in tonnes of CO₂-e/m²)
碳排放 (公噸二氧化碳當量/平方米)



¹ The GFA of PolyU in 2011/12 increased about 23% as compared to 2008/09
2011/12 年度理大樓面總面積比 2008/09 年度增加約 23%。

碳排放

為應對氣候變化帶來的挑戰，理大先後於 2008 年和 2010 年簽署了環保署的「減碳約章」和「香港可持續校園聯盟」的「香港宣言」。為了解本校的碳足印，用作擬定計劃減少碳排放，我們每年在所有樓宇進行碳審計。2011/12 年度，理大的碳排放總量約為 46,500 公噸二氧化碳當量，當中約 96% 來自各類間接排放，例如使用電力及煤氣。我們的碳排放量以樓面總面積¹計算連續兩年下降，共減少約 14%，2011/12 年度為每平方米 0.105 公噸二氧化碳當量。

To minimise the fugitive emissions from the air conditioning system, we selected environmentally friendly refrigerants for the campus chillers. Other than using R-134a in all air conditioning plants in the Student Halls of Residence, we have also used an environmentally preferable alternative R-407c, a mixture of R-32, R-125 and R-134a, in 9 of 66 units since 1996.

Energy Management

In 2011/12, we continued to record a downward trend in fuel consumption on PolyU campus. The total fuel consumption was about 14,000 L, a 12 % decrease as compared to 2010/11. As for the use of electricity, a continuous downward trend on the consumption amount per GFA is noted since 2009/10 (from 216 kWh/m² in 2009/10 to 171 kWh/m² in 2011/12). To reduce our energy consumption, we will continue to adopt new energy saving technologies and promote awareness among students and staff.

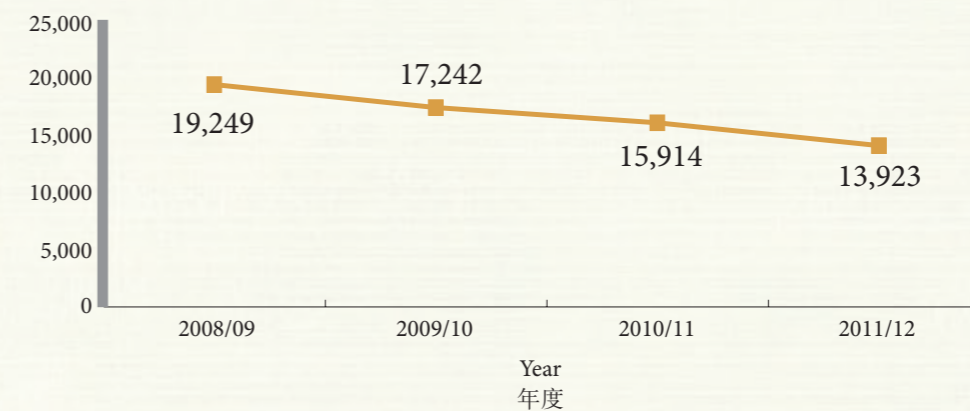
為減少空調系統的逃逸性排放，我們校園的冷水機採用環保製冷劑。所有學生宿舍的空調機一般也採用 R-134a，而自 1996 年起，66 部空調機當中 9 部更選用 R-407c，這種製冷劑混合 R-32、R-125 和 R-134a，環保效能更高。

能源管理

2011/12 年度，理大校園的燃料消耗量繼續下降，總用量約 14,000 升，比 2010/11 年度減少 12%。至於用電量，2009/10 年度至今以樓面總面積計算的用電量亦持續下降（從 2009/10 年度的 216 千瓦時/平方米降至 2011/12 年度的 171 千瓦時/平方米）。為減少消耗能源，我們不斷採用新的節能技術，同時積極向學生和員工推廣節能意識。

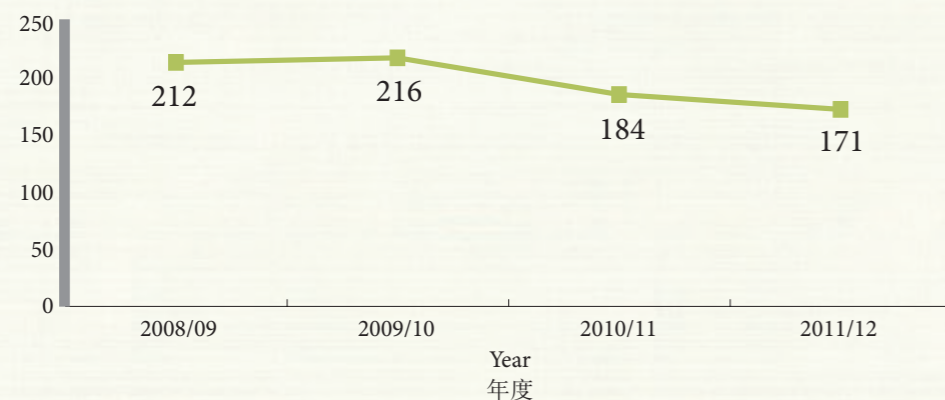
Total Fuel Consumption during 2008/09-2011/12 (in L)
2008/09 至 2011/12 年度燃料總用量 (以升計)

Fuel Consumption (L)
燃料消耗量 (升)



Electricity Consumption per GFA during 2008/09-2011/12 (in kWh/m²) 2008/09 至 2011/12 年度以樓面總面積計算的用電量 (以千瓦時/平方米計)

Electricity consumption (kWh/m²)
用電量 (千瓦時/平方米)



Engineering Technologies to Enhance Energy Efficiency

Further to our efforts to replace air-cooled chillers with water-cooled chillers progressively, we have modified our chilled-water systems in selected buildings on campus to cut down the energy consumption. Differential pressure controllers with water balancing valves have been installed in the systems to enable uniform distribution of chilled water supply to the users. The modification works minimised unnecessary energy use in certain areas with low chilled-water demand. Moreover, pilot study on using new refrigerant type has been carried out to reduce energy consumption in air conditioning chiller units.



Water-cooled Chillers for Buildings on Campus
校園內樓宇的水冷式冷凍機

開拓新技術促進能源效益

原有的風冷式冷水機現已陸續更換，改用水冷式冷水機，此外我們亦改造了校園內個別樓宇的冷凍水系統，降低能源使用量。這些系統加裝了附設水平衡閥的差壓控制器，確保可均衡配送冷凍水給使用者。系統經過改造，可盡量避免某些冷凍水需求低的地方消耗不必要的能源。除此之外，我們亦展開試驗計劃研究新型製冷劑，希望可減少空調冷凍裝置的能源耗用量。

Since 1998, we have adopted a carbon dioxide demand control system in air-conditioned space in some meeting rooms and classrooms. The system consists of carbon dioxide sensors to detect indoor carbon dioxide concentration for real-time speed control of the in-flow of fresh air, and therefore enabling variation of the amount of pre-treated fresh air supplied to meet actual requirement to enhance energy efficiency. In addition, occupancy sensors were installed in general teaching facilities and open plan offices to switch off air-conditioning and lights whenever the venues are not in use.

A variety of energy saving lighting devices have also been applied in PolyU including compact fluorescent lamps, LED lamps, T5 fluorescent tubes and induction lamps since 1993. Similar or more advanced technologies will be continued to apply on campus.

我們於 1998 年開始在部份會議室及課堂的空調機位置設立二氧化碳需求控制系統，藉着二氧化碳感應器探測室內二氧化碳濃度，實時控制鮮風供應的速度，從而根據實際需求調節鮮風量，提高能源效益。此外，一般教學設施及開放式寫字樓現已安裝移動感應器，房間沒人使用時空調及照明會自動關上。

我們已於 1993 年開始採用其他節能照明裝置，包括慳電膽、發光二極管、T5 光管及無極燈。同類或更先進的技術亦將會繼續應用於校園。



Energy-saving Indoor Lighting and Sensor Devices
節能室內照明及感應裝置



- | | | |
|---|---|---|
| 1 | 2 | 1. Induction Lamps
無極燈 |
| 3 | 4 | 2. LED Exit Sign
LED 出口燈牌 |
| | | 3. T5 Fluorescent Tubes
T5 光管 |
| | | 4. Control Sensor in a Lecture Theatre
演講廳的控制感應器 |

Use of Renewable Energy

With the support from Campus Development Office (CDO) and Facilities Management Office (FMO), a research programme on the use of renewable energy within the campus has been conducted by the Renewable Research Group of the Department of Building Services Engineering. A solar photovoltaic system was installed on the roof of Lee Shau Kee Building (Block Y) to provide energy for the building in 2006. The system consists of 126 solar panels of 175 Wp mono-crystalline silicon, with 3 kW grid tie inverters were used for a grid-connected Building-Integrated Photovoltaic (BIPV) application to generate about 20,000 to 25,000 kWh of electricity each year, depending on the rate of annual solar radiation. The amount of electricity generated is equivalent to about saving HK\$20,000 per year of expense on electricity purchase.



The Solar Photovoltaic System Installed on Roof
屋頂太陽能光伏板系統

使用再生能源

在理大轄下校園發展處及物業管理處的輔助下展開研究計劃，並由屋宇設備工程學系的可再生能源研究組在校園試用可再生能源。2006年，李兆基樓裝設了太陽能光伏板系統為大樓供應能源。該系統共有126塊功率為175峰瓦的單晶硅太陽能光伏板，採用3千瓦接駁電網的逆變器，配合接駁電網的建築物光電整合(BIPV)應用技術，視乎年度太陽輻射量，每年約可產生20,000至25,000千瓦小時電力，相等於每年節省港幣20,000元的電費開支。

Waste Management

In line with our target to develop a sustainable campus, we have incorporated the 4R principles (i.e. Reduce, Reuse, Recycle and Replace) to our waste management. A series of year-round environmental campaigns were launched to promote the awareness of resource conservation among our students and staff.

General Municipal Solid Waste

To facilitate students and staff disposing recyclable materials, we have provided a wide range of recycling bins on the PolyU campus.

In 2012, there were 18 sets of 3-colour recycling bins for paper, plastics and metals set up in outdoor public areas within the main campus, about a double of the number of recycling bins in 2009. Also, over 60 tailor-made paper recycling bins have been placed in the offices of PolyU. This innovative and sturdy recycling bin was designed by our School of Design that can accommodate large volume of waste paper generated in the offices.

廢物管理

為達致校園可持續發展的目標，我們在廢物管理方面推行4R方針(即減少使用、物盡其用、循環再用及替代使用)。我們也相應地展開一連串環保運動，積極增進學生和職員保護資源的意識。

一般都市固體廢物

為提供完善設施讓師生放置可回收物品，我們在理大校園設置多類回收箱。

於2012年，校園的室外公眾地方共放置18組三色廢物回收箱，可分類回收廢紙、塑膠和鋁罐，數目比2009年的增加約一倍，此外並於理大各寫字樓設置逾60個由設計學院設計的特製廢紙回收箱，堅固耐用，可容納辦公室產生的大量廢紙。



1. Recycling Bin to Collect Waste Paper in PolyU's Office
理大寫字樓的廢紙回收箱
2. Standard 3-color Recycling Bins for Paper, Plastics and Metals
標準的廢紙、塑膠及鋁罐三色廢物回收箱

The quantities of waste paper and aluminium collected have been continuously decreasing from 2008/09 to 2011/12. Starting from 2010/11, the plastics collected extended from plastic bottles only to a wider scope of plastics to align with the EPD's recyclables classification. Therefore, the amounts of plastics collected were significantly higher in the recent two years than the previous years.

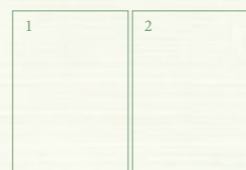
從 2008/09 至 2011/12 年度，我們回收的廢紙和鋁罐數量持續下降。由 2010/11 年度開始，我們配合環保署的可回收物料分類，塑膠的回收種類除膠樽外還涵蓋多類其他製品，因此近兩年塑膠廢物的回收量顯著高於往年。

Quantities of Recyclable Waste Materials Collected during 2008/09-2011/12 2008/09至2011/12年度可回收廢料的回收量



In collaboration with the Greeners Action, PolyU has provided recycling bins for printer cartridges since April 2011 at selected locations of the campus. The collected cartridges, including toner cartridges and inkjet cartridges, will either be refilled or dismantled to retrieve the useful materials. As the start of 1st semester in 2011/12, about 240 cartridges were collected. Besides, recycling boxes for rechargeable batteries have been provided at convenient locations since 2006.

理大與綠領行動攜手合作，於 2011 年 4 月開始在校園多個指定地點設立打印機墨盒回收箱，回收所得的墨盒及碳粉盒如可行的話會重新注墨，否則便會拆解回收內裡的可用物料。在 2011/12 新學期開始時，本校已回收約 240 個墨盒，除此之外，我們亦於 2006 年開始在校內方便地點設置回收箱回收充電電池。



1. Recycling Bin for Printer Cartridges
打印機墨盒回收箱
2. Recycling Box for Rechargeable Batteries
充電電池回收箱

Hazardous Waste

As a tertiary institution equipped with a variety of laboratories, workshops and clinics, it is inevitable that hazardous wastes such as chemical, radioactive and clinical wastes are produced during our daily operations. To safeguard health and safety of our staff and students from being exposed to these wastes, we have appointed Facilities Management Office (FMO) to coordinate the handling of these hazardous wastes on campus. Relevant management plans and procedures have also been formulated to ensure all hazardous wastes are handled properly.

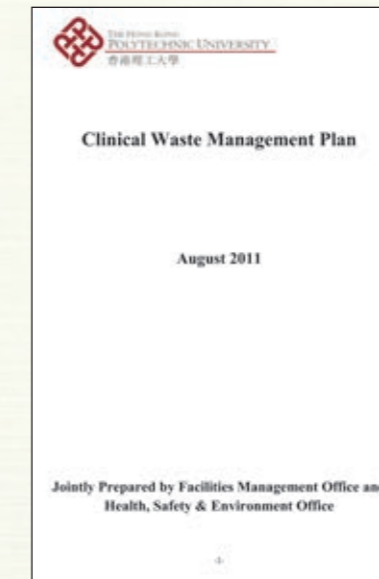
With the new legislation on clinical waste disposal came into effect in August 2011, we have prepared a document namely "Clinical Waste Management Plan" to facilitate our staff and students to handle and dispose of clinical waste properly on campus.

有害廢物

作為一間專上教育機構，理大設有多類實驗室、工作室和診所，這些設施在日常運作過程中定會產生化學品、放射性及醫療廢物等有害廢物，為保障員工、學生及其他公眾的健康與安全，避免他們接觸這些有害廢物，我們特別指定由物業管理處統籌處置校園的有害廢物，同時擬定管理計劃和流程，確保所有有害廢物均得到妥善處理。

隨着 2011 年 8 月新的醫療廢物處置法例生效，我們編製了「醫療廢物管理計劃」，促進員工和學生在校園完善處理及處置醫療廢物。

"Clinical Waste Management Plan" Jointly Prepared by Facilities Management Office (FMO) and Health, Safety and Environment Office (HSEO)
物業管理處和健康安全及環境事務處聯合編製的「醫療廢物管理計劃」



Air Quality

Indoor Air Quality (IAQ)

Situated in a busy urban area next to the Hung Hom Cross Harbour Tunnel with a heavy traffic load, PolyU is very cautious and endeavours to maintain good IAQ in our premises by means of facility design and maintenance procedure to provide a healthy and comfortable indoor environment to building occupants.

To provide well-conditioned air to all buildings on the campus, the mechanical, ventilation and air conditioning (MVAC) systems are carefully designed. In addition to the carbon dioxide demand control system to ensure sufficient supply of fresh air to the premises, particulate filters are installed in the ventilation system for preliminary treatment of the fresh air intakes. Besides, all the air filters, cooling coils and fins are cleaned or replaced regularly to maintain the operating efficiency of the ventilation systems.

With our continuous efforts in improving the IAQ, all the offices, classrooms and library on the main campus were certified as Good Class under the Government's IAQ Certification System for Offices and Public Places in this reporting period. The scheme gives recognition to the premises that achieve certain requirements of 12 IAQ parameters including temperature, relative humidity, air movement, and concentrations of various air contaminants.



IAQ Certificate Received
理大獲頒發的室內空氣質素檢定證書

空氣質素

室內空氣質素 (IAQ)

理大位於市區繁忙地帶，鄰近交通流量極大的紅磡海底隧道。我們深明空氣污染的影響，因此非常小心控制室內空氣質素。除了從設施的設計着手，也設有完善的維修程序，務求將室內空氣質素保持在理想的範圍內，為樓宇使用者提供健康舒適的室內環境。

我們的機械通風及空調系統 (MVAC) 經過悉心設計，可為校園所有建築物供應調節得宜的清新空氣。我們裝設了二氧化碳需求控制系統確保各樓宇的鮮風供應充足，此外通風系統也設有粒子過濾裝置進行鮮風初級處理。此外，所有空氣濾網、冷卻盤管及散熱片均定期清潔或更換，以保證通風系統達到最佳操作效能。

多年來我們全力改善室內空氣質素，理大主校園所有寫字樓、課室及圖書館在本匯報期均取得政府「辦公室及公眾場所室內空氣質素檢定計劃」的良好級別。該計劃旨在嘉許室內空氣質素優良的場所。場所必須符合針對 12 項不同參數的要求，包括溫度、相對濕度及多種空氣污染物的濃度。



Library Achieved a Good Class under the IAQ Certification Scheme to Provide a Healthy and Comfortable Condition for Our Students and Staff
圖書館在室內空氣質素檢定計劃取得「良好」級別，為學生及員工提供健康舒適的室內空氣環境

Water Conservation

Realizing water scarcity on the Earth, PolyU has already adopted a number of water saving initiatives on campus. Sensor operated water taps as well as water saving shower heads in showering facilities were installed on campus. As PolyU is using fresh water for toilet flushing, water-free urinals were installed in 3 male toilets in April and June 2011. The performance of these 10 urinals was closely monitored. Adoption of other measures such as dual-flush toilets with two different flush volumes and water taps equipped with aerators are also being considered to reduce flushing water consumption. Water saving measures implemented in air-conditioning systems included recycling of air-conditioning condensate for use in cooling towers' make-up water and the reuse of bleed-off water from cooling towers.



Water-free Urinals Installed in a Selected Toilet
男廁試裝無水式小便盆

節約用水

理大深明地球的水資源彌足珍貴，因此在校園實施多項節約用水措施，包括在沐浴設施裝設感應式水龍頭和慳水花灑頭。由於理大樓宇用淡水沖廁，我們於 2011 年 4 月及 6 月在 3 個男廁試用 10 個無水式小便盆，我們一直緊密監察這些設備的性能。與此同時，我們也研究其他可減少沖廁用水的措施，例如設有兩種用水量的二段式沖水馬桶和附設曝氣器的水龍頭。至於用於空調系統的節約用水措施則包括回收空調冷凝水供應冷卻塔作補給水，以及循環再用冷卻塔所排放的水。



Launch of Electric Vehicle “MyCar”
電動車 MyCar 面世



Green Transportation

In order to promote green living and minimise roadside air emissions, an electric vehicle “MyCar”, which was jointly developed by PolyU and a business partner, is using to provide transportation service for our staff. Due to limitation in speed, this electric vehicle currently only provides transportation from the campus to nearby areas. Besides, we are using another electric vehicle for the delivery of municipal waste within the campus.



Electric Vehicle Replaced Traditional Diesel Vehicle for the Delivery of Municipal Waste to Reduce Air Emissions
以電動車取代傳統柴油車運輸廢物，減少廢氣排放

環保運輸模式

為提倡綠色生活及盡量減少路邊廢氣，理大與其合作夥伴聯合研發了一款電動車 MyCar。由於電動車車速有限，現時只可往來校園和鄰近地區，為員工服務。此外我們還利用另一款電動車在校園內運輸廢物。

Prohibition of idling of vehicle engines is another way to improve local air quality on campus. Before the enforcement of the Motor Vehicle Idling (Fixed Penalty) Ordinance, we have already recommended drivers to switch off their vehicle engines while waiting at the loading areas. Notices are posted at these areas to remind drivers to switch off idling engine to avoid excessive emissions.



Notice Posted on PolyU Campus to Remind Drivers to Switch Off Engine While Waiting
理大校園的停車熄匙告示

Green Procurement

To promote the use of green products, a “Green Procurement Practice Guide” has been prepared by our Finance Office. Priority would be given to environmentally friendly materials and equipment such as office paper with recycled contents or Forest Stewardship Council certification, electrical appliances achieving the Grade 1 requirement of the Energy Efficiency Label, photocopiers with low ozone-emitting design and toner recycling mechanism, rechargeable batteries, ball-point refills, etc. Our Finance Office is spending continuous efforts to enhance green procurement on campus.



1. A4 Paper with Recycled Content
含有循環再造成份的 A4 紙
2. Refrigerator with Grade 1 Energy Label
一級能源效益標籤雪櫃

禁止汽車引擎空轉是改善校園空氣質素的另一項措施。早於《汽車引擎空轉（定額罰款）條例》實施之前，理大已建議司機在客貨上落區等候時關掉引擎，並在這些地點張貼告示，提醒司機停車熄匙，避免排放廢氣。

環保採購

財務處編製了《環保採購指南》，提供採購環保產品的指引，優先選購環保物料和設備，包括含有再造成份或取得林業管理公會證書的辦公室紙品、一級能源效益標籤電器、低臭氧排放設計和設有墨盒回收機制的影印機、充電池、原子筆芯等。此外，財務處亦一直不遺餘力，在校園內提倡環保採購。