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sustainability in schools



CIS Sustainability Review Executive Summary

漢基可持續發展評估 執行摘要

Executive Summary

Introduction

This is a summary of the whole-school sustainability review conducted by [Metanoia](#) and the student groups [Drop in the Ocean \(DITO\)](#) and CIS Footprint in the 2019-2020 academic year. The review covered the following aspects of the school's operations: Energy, Water, Travel, Procurement and Waste, Food and Food Waste, Buildings and Grounds, Curriculum, Community Engagement, Governance and Decision-making, and Communication. The students presented the findings to the Leadership Team in March 2020 and the Board of Governors in June 2020, and the final report was published in September 2020.

As of the start of the 2020-2021 academic year, DITO, CIS Footprint and the newly established Sustainability Council are beginning to implement some of the report's 100+ recommendations. Other recommendations will require feasibility assessments and capital budget allocations to be taken further. A school-wide sustainability strategy would be a helpful framework to guide this work in the long term.

Assessing the school's environmental impacts and beginning to act on the findings has been, and continues to be, a rich learning and leadership experience for the students. As CIS develops its next strategic plan, the sustainability review is a timely opportunity, not just for the students but also for the community as a whole, to reflect on the place of sustainability within the mission and ethos of the school and how it is equipping its students – the first generation of the Anthropocene era¹ – to lead the transition to a sustainable future.

¹ The anthropocene era is a proposed new geological epoch characterised by the recent onset of significant human impacts on the earth's climate and ecosystems.

1. Stakeholder perspectives on sustainability at CIS

The sustainability review began with a series of interviews to gauge what CIS community members thought about sustainability, its relevance to the school's mission and values, and how sustainable they considered the school to be. Thirty-nine key stakeholders were interviewed, representing a cross section of Primary and Secondary students, faculty, parents, administrative staff, board members, and members of the leadership team.

Six main themes emerged in these conversations: the importance of student leadership in developing sustainability at CIS, the need for a whole-school sustainability strategy, the value of a connection to nature, the challenge of catalysing behaviour change, the desire to further integrate sustainability into the curriculum, and the benefits of establishing greater collaboration on sustainability between the Primary and Secondary schools (see pages 20-33).¹

Seventy percent of those interviewed identified sustainability as one of the key issues that will impact students' lives over the next 50 years, yet many observed that the interview was the first time they had engaged in an extended conversation about sustainability at CIS. Responding to an online survey, most of these stakeholders acknowledged that the school was "just getting started" in many dimensions of its sustainability journey (see page 30).

¹ Page references throughout this summary refer to pages in the full report.

執行摘要

簡介

這份摘要將概述由Metanoia與學生組織Drop in the Ocean(DITO)和「漢基足跡」於2019-2020學年度進行的全校可持續發展評估。上述評估涵蓋了學校運營的以下方面：能源、水、旅行、採購與浪費、食物與食物浪費、建築物與土地、課程內容、社區參與、治理與決策以及宣傳。學生於2020年三月和六月分別向領導團隊和董事局報告了審計的結果，而最後報告於2020年九月發布。

截至2020-2021學年初，DITO、「漢基足跡」以及新設立的可持續發展委員會現已開始部分實施報告內的100多項建議。其餘的建議將需要採取進一步的可行性評估和資本預算撥款。長遠而言，全校可持續發展策略會是引導這項工作的良好框架。

一如既往，評估學校的環境影響並根據結果採取行動對於學生們來說是豐富的學習和領導經驗。隨著漢基逐步修訂遠景規劃，正合適進行可持續發展評估，不僅對於學生還有全體社群，藉以反思可持續發展在學校宗旨及校風的定位以及學校如何培養其學生，人類世¹的第一代，領導過渡進程以實現更可持續的未來。

1 人類世是一個新提議的地質概念，以近代人類對地球的氣候及生態系統的重大影響為特點。

1. 持份者對漢基可持續發展的看法

可持續發展評估由一系列的訪談而起，以了解漢基社群的成員對可持續發展的想法及其對學校宗旨和價值的相關性，以及他們認為學校現時可持續的程度。受訪的三十九位關鍵持份者代表了小學和中學生、老師、家長、行政人員、董事局以及領導團隊成員。

這些對話反映了六個主要專題：學生領導對漢基可持續發展的重要性、對全校可持續發展策略的需求、與大自然聯繫的價值、促進行為改變的挑戰、對進一步將可持續發展融入課程的渴望以及加強中小學針對可持續發展的合作之益處（見20-33頁）。¹

百分之七十的受訪者認同可持續發展是在未來五十年會影響學生的生活的關鍵議題之一，然而多人指出該次訪問是他們首次參與有關漢基可持續發展的深入對話。提交網上調查問卷的持份者多數承認學校在可持續發展旅途上的多個方面「才剛剛起步」（見30頁）。

1 此摘要中的頁面參考是指完整報告中的頁數。



Table 1

Summary of key environmental impacts of CIS's operations, 2018-2019

		Units	Quantity	Est. emissions (t CO ₂ eq.)	Notes
Population		no.	1,827		
Gross Floor Area		m ²	17,353		
Energy	Electricity	kWh	2,671,241	2,137	
	Gas	kWh	36,990	8	
Energy Use Intensity	Block 0	kWh/m ²	133		
	Blocks 1-7	kWh/m ²	160		
Travel	Commuting	km	6,355,396	214	
	Overseas flights	km	8,548,031	1,403	
Water	Fresh water	m ³	30,668	14	(1)
	Rain water	m ³	1,250	0	
Key Materials Purchased	New uniforms	Items	12,270		
	Paper for printing	Sheets	1,535,000		
	New printed textbooks	Items	18,500		
	MacBooks and iPads	Units	170	22	(2)
Waste	Food waste	Tons	10.5	31	(3)
	of which, composted	Tons	3.8	0.1178	(3)
	General waste	Tons	n.a.		
	Recycling	Tons	n.a.		
	Tetra Paks sold	Items	0		
	Old air conditioning units	Units	10		
	of which, refrigerant	kg	1	2	(4)
Total				3,798	

Notes:

(1) Based on Unit Electricity Consumption (Fresh Water and Raw Water) of 0.577 kWh per cubic metre.

(2) Apple environmental reports for MacBook Pro, iPad and iPad Pro multiplied by the number of each unit purchased. Estimated emissions include end of life recycling.

(3) The carbon intensity is from Moulton et.al. Greenhouse Gas emissions of food waste disposal options for a UK retailer (2018)

(4) Metanoia estimates assuming the gas is vented.

表 1

漢基運營的關鍵環境影響概況, 2019-2020

		單位	數量	估計排放量 (噸二氧化碳當量)	備註
人口		數目	1,827		
建築面積		m ²	17,353		
能源	用電	kWh	2,671,241	2,137	
	煤氣	kWh	36,990	8	
能源耗量強度	0 座	kWh/m ²	133		
	1-7座	kWh/m ²	160		
旅行	通勤	km	6,355,396	214	
	海外飛行	km	8,548,031	1,403	
用水	淡水	m ³	30,668	14	(1)
	雨水	m ³	1,250	0	
採購的關鍵材料	新校服	項	12,270		
	印刷紙	張	1,535,000		
	新印製教科書	項	18,500		
	MacBook及iPad	單位	170	22	(2)
浪費	食物浪費	噸	10.5	31	(3)
	其中被轉為堆肥	噸	3.8	0.1178	(3)
	一般廢棄物	噸	n.a.		
	回收物	噸	n.a.		
	出售的利樂包裝	項	0		
	舊型空氣調節系統	單位	10		
	其中之製冷劑	kg	1	2	(4)
總量				3,798	

備註:

(1) 根據每立方米0.577千瓦時的單位耗電量(淡水與雨水)。

(2) Macbook Pro、iPad及iPad Pro的Apple環保報告乘以每單位所採購的數量。估計的排放量包括生命週期結束後的回收。

(3) 碳強度來自Moult et al. 英國零售商的食物浪費棄置選項的溫室氣體排放(2018)。

(4) Metanoia的估算基於氣體被排放的假設。

2. Energy

CIS's electricity use generated 2,119 tons of CO₂ or 56% of the school's total emissions in 2018-2019. The school consumed 2.6 million kWh of electricity (a HK\$ 3.1 million expense) and a small amount of gas (26,900 kWh). Air conditioning is the largest user of electricity, with an estimated 70-80% share, followed by lighting. The average energy use intensity (EUI) of the buildings on campus is 156 kWh/m² per year. Block O, which received a LEED Gold rating in 2017, has an 18% lower EUI than the other buildings due to its many energy efficient design features.

There are few publicly available benchmarks for the energy intensity of schools in Asia and comparisons must be made with caution because the samples are small and EUI varies according to climate zones. Nevertheless, there are some indications that CIS's energy intensity is much higher than other comparable schools. For example, the mean EUI of a sample of 80 schools in Hong Kong reported by the EMSD is 59 and a study of Secondary schools in Taiwan reported an EUI of 56 (see page 43). On the other hand, the mean EUI of a small sample of international schools in Hong Kong is 111 kWh/m²/y and the median EUI for K-12 schools in the US across a wide range of climate zones is 152 kWh/m².¹

Comparisons notwithstanding, there is room for CIS to reduce its energy use and the associated emissions. The low hanging fruit in terms of hardware improvements are air conditioning, lighting and windows, upgrades of which are already underway and ongoing.

Limited data was available on the energy efficiency of the air conditioning units currently in use on campus, but a survey of a 10% sample

¹ This is the median site EUI for K-12 schools in the US across a wide range of climate zones, reported in: US Energy Use Intensity by Property Type, EnergyStar Portfolio Manager – Technical Reference (August 2018).

CIS's electricity use generated 2,119 tons of CO₂ or 56% of the school's total emissions in 2018-2019.

indicated that two thirds had energy efficiency ratios (EERs) of less than 3.6. Best available technology today can achieve EERs of 6-7.² Some models are designed with heaters in the condenser which, although small loads, are always on and can increase energy consumption by 10-20% over the course of a year. When procuring replacement air conditioning units, the school should seek those with the highest available EER and no crankcase heaters. Attention should also be paid to the refrigerant gases used, as they have global warming potentials 1,500-2,000 times that of CO₂.

Ninety percent of the lights on campus are LEDs but 60% of them have efficiencies below 100 lumens per Watt (lm/W). Upgrading the LEDs to efficiencies of 125 lm/W – the optimal lighting efficiency for education according to a US study – would result in about a 3% annual savings (see pages 48-50).

The swimming pool is heated to 29-30 degrees Celsius for most of the year. Although the heating system is not separately metered, it is estimated to account for 5-10% of the school's energy consumption, making it the largest single point consumer of electricity on campus. Using a pool cover could reduce this by 15-20%.

Apart from hardware improvements, behaviour change is also key to energy savings and emissions

² International Energy Agency. The Future of Cooling: Opportunities for Energy-Efficient Air Conditioning. (2018).

2. 能源

漢基的用電產生了2119噸二氧化碳，即學校2018-2019年總排放的56%。學校消耗了260萬千瓦時的電量（港幣\$310萬的費用）以及少量的煤氣（26900千瓦時）。空調的耗電量最高，估計佔總耗電量的70-80%，其次是照明設備。校園建築物的平均能源耗量強度（EUI）是每年156 kWh/m²。2017年獲得能源與環境設計領袖（LEED）金級認證的新大樓具備多項高能效設計特色，因而EUI低於其他大樓的18%。

目前只有少數位於亞洲的學校公開了能源強度基準，而進行比較時必須保持謹慎，因為樣本很小而且 EUI 會因氣候帶的不同而改變。然而，有跡象顯示，漢基的能源強度比其他相若的學校更高。例如，如機電工程署所報告，香港80所樣本學校的平均 EUI 為59，而一項研究顯示台灣的中學的平均 EUI 為56（見43頁）。另一方面，香港的國際學校少量樣本的平均 EUI 為111 kWh/m²/y，而位於美國並涉足多個氣候帶的K-12學校的 EUI 中位數為152 kWh/m²。¹

¹ 這是位於美國的K-12學校場所的EUI中位數，涉及多個氣候帶，資料源於：US Energy Use Intensity by Property Type, EnergyStar Portfolio Manager - Technical Reference (August 2018)

漢基的用電產生了2119噸二氧化碳，即學校2018-2019年總排放的56%。

儘管如此，漢基仍有空間減低能源用量及相關排放。在硬件方面，改善空調、照明設備及窗戶較容易實現，並已落實。

有關校園目前使用的空調的能源效益的數據有限，但一項針對10%的空調系統的調查顯示其中三分之二的能源效益比例（EER）低於3.6。現今最佳的技術可以達到6-7²的能源效益比例。部分型號設計的冷凝器具有加熱器，雖然負載較小，卻長期開啟並能在一年間將能源耗量提高10-20%。採購替換的空調系統時，學校應尋求能源效益比例最高並且不符有曲軸加熱器的型號。學校還應注意所使用的製冷劑氣體，其全球暖化潛勢比二氧化碳高1500-2000倍。

校園百分之九十的照明設備是發光二極管（LED），但其中60%的效益低於100 lm/W。將LED燈的效益改善至

² International Energy Agency. The Future of Cooling: Opportunities for Energy-Efficient Air Conditioning. (2018).



reductions. Research has shown that a one degree change in air conditioning set point temperature, for example, can reduce energy consumption by 6% and a five degree change (from 20 to 25 degrees Celsius) can save 30% (see page 46). The set points for the new air conditioner units at CIS are centrally controlled and reset every day to a default of 23 degrees but can be overridden locally, while the older air conditioning units can only be controlled locally. As individual set point preferences vary widely, there is almost certainly scope for savings, however more work is needed to develop and test a strategy for achieving them. Further savings could be achieved by turning off the new air conditioning units automatically 30-60 minutes earlier than the current 6 p.m.

Finally, there is tremendous potential for solar energy to be installed on campus: 30-40 kWp on the roof and 500 kWp on the west façade. This could reduce carbon emissions from electricity use by 10% and, at current feed-in tariff rates, save HK\$ 1.25 million per annum or 40% of the school's annual electricity bill from now until 2033 (see pages 52-53).

60%

of the school's water use is for toilet flushing

3. Water

CIS consumed 30,000 m³ of fresh water in 2018-2019, 60% of which (the equivalent of seven Olympic swimming pools) was for toilet flushing. Although most of Hong Kong uses seawater for toilet flushing, the school is not connected to Hong Kong's seawater supply network because of its elevated location. CIS recently replaced most of its single flush toilets with dual flush, cutting its water use by 25% over the last three years.

The swimming pool, which is emptied and refilled annually, accounts for 1.5% of the school's water use. Rainwater harvesting supplements the Block O flushing system, displacing an estimated 4% of the school's freshwater consumption.

4. Travel

CIS students and staff travelled approximately 6.4 million kilometres to and from school and flew another 8.5 million kilometres for school-related overseas trips in the 2018-2019 academic year. Total CO₂ emissions from travel were 1,617 tons, 90% of which are the result of flying (see page 68).

Two thirds of the CIS community travel to school using some form of sustainable transportation (e.g. school bus, public transport, walking) but close to half still commute by car and only a quarter of those cars are electric (see pages 70-71).

The school could reduce the carbon footprint of its daily commuting by encouraging greater use of the school buses, public transport, walking and electric vehicles (EVs), and by lobbying the bus company to introduce electric school buses and requiring them to use biodiesel.

Project Week generates a third of the school's flight-related emissions – more than any other trip category – and three quarters of the Project Week emissions in 2018-2019 were the result of long-haul flights. Emissions from Project Week could be reduced by increasing the number and variety of Project Week options that don't involve flying; at present there are very few (see pages 86-87).

Flights to Hangzhou – the school's most visited destination – are responsible for about 18% of CIS's total travel-related emissions. Taking the train to Hangzhou instead of flying would reduce emissions by 60% and the door-to-door journey is only three hours longer (see page 85).

125 lm/W – 據美國調查是教育所的最佳燈光效益 – 估計會節省每年3%的支出(見48-50頁)。

游泳池一年間大部分時間都加熱至29-30攝氏度。雖然加熱系統沒有獨立的電表,但估計最多佔學校能源耗量的5-10%,即成為校園用電量最高的單點設施。使用泳池保溫膜蓋可將用電量減少15-20%。

除了改進硬件外,行為改變對於節省能源及減低排放是至關重要的。研究顯示,空調設定點溫度一度之差可將能源耗量減少6%,而五度之差(從20到25攝氏度)可節省30%(見46頁)。漢基新型空調系統的設定點被集中控制,每天重新調整至23度,但可在本機任由重置,舊型空調系統則只能由本機控制。由於個別的設定點取向範圍甚廣,這方面基本確定有節省開支和能源的空間,但需要進一步的工作才能制定並檢驗相關策略。於目前的下午六點早30-60分鐘關閉新型空調系統可進一步節省能源和開支。

最後,校園安裝太陽能的潛力極大:天台上30-40千瓦磅以及西面外牆上500千瓦磅。這可將用電的排放量減少10%,而且,按當前的上網電價計算,每年可節省港幣\$125萬,即學校由現時至2033年年度電費帳單的40%(見52-53頁)。

60%

學校60%的用水源於沖廁

3. 水

漢基於2018-2019年消耗了30000立方米的淡水,其中60%(相當於七個奧林匹克規格的游泳池)用於沖廁。儘管香港大部分地區都使用海水沖洗廁所,但是由於漢基的地理位置較高,學校並未與香港的海水供應系統連接。漢基最近將大部分的單沖式馬桶換為雙沖式馬桶,三年以來將用水量減少25%。游泳池每年需要排水和給水,佔學校用水的1.5%。雨水收集提供新大樓的沖洗系統的沖水,估計將學校的淡水消耗量減少4%。

4. 交通

2018-2019學年,漢基的學生和老師往返學校約640萬公里,並且在與學校相關的海外旅行飛行850萬公里。旅途中產生的二氧化碳總排放量為1617噸,其中90%源於飛行(見68頁)。

在上學的路上,三分之二的漢基成員使用可持續發展的交通工具(例如校車、公共交通、步行),但仍有將近一半搭乘私家車往返學校,其中只有四分之一是電動汽車(見70-71頁)。

通過鼓勵更多地使用校車、公共交通、步行及電動汽車,以及遊說校巴公司引入電動校車並要求它們使用生物柴油,學校可以減少日常交通活動的碳足跡。

「項目週」(Project Week)佔學校飛行排放的三分之一,高於任何其他旅行類別的排放量,而且2018-2019學年的「項目週」四分之三的排放源於長途飛行旅程。增加不涉及飛行的「項目週」選項的數量和種類可以減少「項目週」的排放;目前只有很少此類型的選項(見86-87頁)。

飛往杭州的航班佔漢基旅行總排放量約18%,是學校最常到訪的目的地。乘火車而非飛機去杭州可以減少60%的排放,而行程僅增加三小時(見85頁)。

學校應考慮為旅行相關的所有排放購買碳補償計劃,包括通勤、前往香港境內的體育活動和比賽的旅程以及海外旅行。按當前價格計算,估計漢基通勤排放的成本每年為港幣\$17,000,所有飛行排放的成本每年為港幣\$100,000(見86頁)。

乘火車而非飛機去杭州可以減少60%的排放,而行程僅增加三小時。

The school should consider purchasing carbon offsets for all its travel-related emissions – commuting, travel to sporting and other fixtures within Hong Kong, and overseas trips. At current prices, the cost of this is estimated to be HK\$ 17,000 annually for commuting emissions and HK\$ 100,000 per year for all flight emissions (see page 86).

Taking the train to Hangzhou instead of flying would reduce emissions by 60% and the door-to-door journey is only three hours longer.

5. Procurement and Waste

With a few exceptions (for example, sustainably-certified paper), sustainability has not been a consideration in the selection of goods and services procured by the school. CIS should consider adopting a sustainable procurement policy to address this.

The food service and school bus service contracts do not contain any sustainability-related performance provisions and the contractors are selected primarily on the basis of cost and service delivery. Given that 25% of global greenhouse gas emissions are associated with food production¹ and that 18% of Hong Kong's carbon emissions are transport-related, CIS should require its service providers to commit to reporting on and reducing

the emissions associated with their services. Some options are discussed in the chapters on Food and Food Waste and Travel.

The three largest categories of goods CIS procured by dollar value in the 2018-2019 academic year were books and teaching materials, IT equipment (MacBooks and iPads), and air conditioners.

Some 18,500 books and textbooks were purchased by the CIS community that year, requiring an estimated 200-400 trees to be cut down to produce them (see page 97). The online learning resources the school has developed in response to the Covid-19 pandemic suggest that there is scope to reduce the number of books that are procured in printed form.

General waste, food waste, textbooks, paper and school uniforms are among the school's top waste streams. General waste is sent to landfill at no cost. No data is available on the quantity of general waste the school produces and a planned audit of the contents of general waste was postponed due to restrictions related to Covid-19. Food waste is discussed in the following section.

Old textbooks owned by the school are generally donated to schools or charities, either locally or overseas. Students are required to purchase individual textbooks for some subjects but no information was available about how those books are disposed of. In general, books that are bound together by glue or contain plastic coated pages or covers – methods commonly used in textbooks – cannot be recycled.

CIS purchased 3,070 reams (1,535,000 sheets) of paper for printing, photocopying and general use in the 2018-2019 academic year. The paper CIS buys is PEFC² certified but contains no recycled material. Once used, this paper is usually separated

1 Poore, J., and T. Nemecek. "Reducing Food's Environmental Impact through Producers and Consumers." *Science* 360, no. 6392 (1 June 2018): 987-92.

2 Programme for the Endorsement of Forest Certification

5. 採購與浪費

除了少數例外（例如，經過可持續認證的紙張），學校採購商品和服務時未考慮可持續發展。漢基應考慮採取可持續發展採購政策以解決此問題。

食品服務和校車服務合同不包含任何與可持續發展相關的規定，而承包商的選擇主要基於成本和服務提供。鑒於全球25%的溫室氣體排放與糧食生產有關¹，而香港18%的碳排放與運輸有關，漢基應該要求服務提供商承諾報告及減少與其服務相關的排放。食物與食物浪費及旅行部分有提到部分的選擇。

2018-2019學年，按照價值計算，漢基採購的三大商品類別為書籍和教學材料、科技設備（Macbook和iPad）以及空調。

漢基社群在該學年購買了18500本書和課本，估計導致200-400棵樹木的砍伐（見97頁）。學校為了應對新冠疫

情而研製的網上學習資源，證明了減少購買印刷書本的數量的可能性。

一般廢棄物、食物浪費、課本、紙張以及校服構成了學校的主要廢物流。一般廢物在免費情況下被送到堆填區。目前沒有關於學校產生的一般廢物數量的數據，而由於疫情有關的限制，對一般廢物內容的審計會延期進行。下一部分將討論食物浪費。

學校的舊課本通常會捐贈給本地和海外的學校或慈善機構。學生需要自行購買某些科目的課本，但沒有如何處置課本的相關資訊。一般而言，用膠水黏合的書本或包含塗有塑料的書頁和封面的書本無法回收——課本中常用這些印刷方法。

漢基於2018-2019學年購買了3070疊紙（1535000張）用於打印、複印以及一般的用途。漢基購買的紙經過PEFC²認證，但不包含任何已回收的物料。一旦使用過後，紙張通常會被分類並放入校園裡的回收箱，最終出

1 Poore, J., and T. Nemecek. “Reducing Food’s Environmental Impact through Producers and Consumers.” *Science* 360, no. 6392 (1 June 2018): 987-92.

2 森林驗證認可計劃



CIS purchased 18,500 printed textbooks and 12,000 school uniforms in the 2018-2019 academic year.

and put in the recycling bins around the campus and ultimately sold to small waste collectors for recycling. The recovery rate of recycled paper and cardboard at CIS appears to be high, but the school does not collect data on this.

School uniforms represent a very significant waste challenge, one that warrants more attention. CIS students purchased 12,270 new uniform items in 2018-2019, 7% of which were Hangzhou-specific pieces. Most uniform items are typically only worn for a short period, sometimes for less than a year, and the end-of-life options are limited. Many of the items are made of blended fabrics, which render them more difficult to recycle and, in any case, there is limited textile recycling capacity in Hong Kong currently. CISPTA hosts second-hand uniform sales from time to time but there is no data on the quantity of items they sell or the recovery rate. Used uniform items which don't have a logo on them may be donated to charity but it is likely that a significant number of used uniform items end up in landfill each year (see pages 100-105).

A detailed analysis of the sustainability of the raw material sourcing and production and how the uniforms are manufactured was beyond the scope of this review. Further work is recommended to consider how the uniform might be designed to improve its recyclability and minimise the environmental and social impact of its production.

6. Food and Food Waste

A dramatically different global food system is a necessary condition for a sustainable future on a finite planet with a carrying capacity of 10 billion people. CIS can help shape this critical change by working with Chartwells, the school's food service provider, to ensure the food they procure is sustainably sourced, that an interesting variety of plant-based options are available on the menu, and that less food is wasted.

Currently, some vegetarian menu options are offered at the Cafeteria and Rooftop Café every day, but not in the Eatrium. A full analysis of the sustainability of the menu at CIS was beyond the scope of this review but is recommended for future study in collaboration with Chartwells. As noted in the procurement section, consideration should also be given to including sustainability provisions in future food service contracts.

CIS produces around 10.5 tons of food waste annually, or about 55 kg per day. Two thirds of this is from plate scrapings, which are separated and pretreated for composting, but there is no capacity to treat the back-of-house food waste, which is being sent to landfill. The school should consider investing in a proper composting plant with enough capacity for all of its food waste (see pages 125-130).

10.5

tons of food waste is produced per year, only half of which is composted

2018-2019學年，漢基購買了18500本印刷的課本和12000件校服。

售給小型廢物收集商進行回收。漢基的紙張和紙板回收率似乎很高，但學校並沒有收集相關數據。

校服對學校的浪費構成非常重大的挑戰，值得更多的關注。2018-2019學年，漢基的學生購買了12270件新校服，其中7%是杭州的校服。大多數的校服通常只在很短的時期內穿戴，有時不到一年，而使用壽命終止後的選擇有限。許多物品都由混紡織物製成，使得它們更難以回收，而且無論如何，目前香港的紡織品回收能力有限。漢基家長會有時會舉辦二手校服銷售活動，但沒有有關出售物品數量或回收率的數據。沒有勳章的舊校服可能會捐贈給慈善機構，但是極有可能每年仍有大量穿過的校服被送到堆填區（見100-105頁）。

對校服原材料採購和生產以及製作方式的可持續發展分析超出了此次評估的範圍。本報告建議學校實行進一步的工作，考慮如何改善校服的設計，以提高其回收率並盡量減少其帶來的環境和社會影響。

6. 食物與食物浪費

為了在可容納100億人口的有限的地球上實現可持續發展的未來，一個顯著不同的全球糧食體系是必要條件。漢基可以與學校的飲食服務機構澤慧（Chartwells）合作，確保他們採購可持續發展的食物，在菜單上提供有趣的植物性飲食，並且減少食物浪費，從而促進重大的變化。

目前，餐廳和天台咖啡廳每天都有提供素食菜單選項，但Eatrium並沒有提供。對漢基菜單進行可持續發展全面分析超出了此次評估的範圍，但建議學校與澤慧合作進行進一步的研究。如採購部分所述，學校還應該考慮將可持續發展的規定納入未來的食品服務合同當中。

漢基每年產生10.5噸的廚餘，即每天55公斤。其中三分之二來自碟上的殘餘食物，會被分類並轉為堆肥，但是學校沒有能力處理被送到堆填區的支援設施廚餘。學校應該考慮尋找足以處理所有廚餘的堆肥廠（見125-130頁）。

10.5

學校每年產生10.5噸廚餘，其中只有一半被轉為堆肥。



7. Buildings and Grounds

Sixty percent of Hong Kong's annual carbon emissions are associated with buildings, and the indoor environment of those buildings is a key determinant of the health and wellness of occupants, as well as their cognitive performance.

With this in mind, the following aspects of the school's buildings and grounds were reviewed: building design and energy efficiency, green space and biodiversity, indoor air quality, and cleaning products.

Building design and energy efficiency

Block O was built in 2016 and awarded a LEED 2009 Gold rating¹ on the strength of its many sustainable design features including double glazed windows, rainwater harvesting, open balconies and corridors, optimising daylight, using low-emitting paints and adhesives, and the building's proximity to public transport. It is the most energy-efficient building on campus, using 18% less energy per square metre than the other buildings at CIS. However, only 15% of the materials used in its construction were sourced within 800 kilometres, only 5% of the building material by value was made from recycled materials, and no renewable energy was included in the building's design.

CIS is in the process of upgrading all of the windows in the older campus buildings (Blocks 1-7) from single glazed to double glazed units with a U value of 1.86 W/m²K, which is expected to significantly improve their energy efficiency (see pages 142-143).

The school should adopt a sustainable building policy which includes targets for embodied

¹ This was the prevailing LEED standard for new buildings at the time. Gold means a score in the range of 60-79 points. Block O scored 61 points.

carbon, energy use intensity and renewable energy in all future new buildings.

Green space and biodiversity

The campus is surrounded on three sides by Tai Tam Country Park and students enjoy views of the park from most indoor locations, but there is limited greenery on campus and very little in most classrooms. A survey revealed 12 different species of large trees on campus, six of which are native, including the Bauhinia, the flower of which is Hong Kong's emblem. Another 48 different species of plants and small trees were also identified, six of which are native. CIS should explore ways to increase the amount of greenery on campus, including green walls.

Indoor air quality

Five-minute measurements of the levels of CO₂, VOCs and PM_{2.5} were taken in a significant sample of rooms throughout the campus on a day in May 2020, when the rooms were not in use. CO₂ levels were 'excellent', and levels of volatile organic compounds (VOCs) were 'good', according to the Hong Kong guidelines; and PM_{2.5} levels were well within the 24-hour levels recommended by the World Health Organisation (see pages 145-149).

Cleaning Products

We reviewed the Material Safety Data Sheets of all the cleaning products in use at CIS. None of them meet the LEED O&M standard, which requires products to be certified according to one or more internationally recognised eco-friendly standards, and some products contained ingredients with undesirable environmental impacts. The school should transition towards using cleaning products that meet the LEED O&M standard.

7. 建築物與土地

香港每年百分之六十的碳排放與建築物有關，建築物的室內環境是定居者健康和保健以及認知能力的關鍵決定因素。

有鑒於此，我們對學校的建築物與土地的以下方面進行了評估：建築物設計及能源效益、綠色空間及生物多樣性、室內空氣質素以及清潔產品。

建築物設計及能源效益

新大樓於2016年建成，憑著多項可持續發展設計特點，包括雙層玻璃窗、雨水收集、開放式陽台及走廊、採光、使用低排放油漆和粘合劑以及接近公共交通，獲得了能源與環境設計領袖（LEED）的2009年金級認證¹。它是校園內能源效益最高的大樓，每平方米的能耗低於漢基其他大樓的18%。但是，新大樓僅15%的建築材料是在800公里範圍內採購的，按價值計算，只有5%的建築材料由回收物料製成，而建築物的設計並沒有包含可再生能源。

漢基正將舊的大樓（1至7座）的所有窗戶從單層玻璃改為U值為 $1.86 \text{ W/m}^2\text{K}$ 的雙層玻璃裝置，有望顯著提高其能源效率（見142-143頁）。

學校應採取可持續發展建築政策，其中包括未來所有新建築物的具體碳排放、能源耗量強度以及可再生能源目標。

綠色空間及生物多樣性

校園被大潭郊野公園三面包圍，學生可以從大多數室內位置欣賞公園的景色，但是校園內的綠化範圍有限而大多數教室的植物都很少。一項調查顯示，校園內有12種不同的大樹，其中六種是本地樹種，包括洋紫荊，是香港的市花。調查辨認出另外48種不同的植物和小樹種，其中六種是本地品種。漢基應探索增加校園綠化數量的方法，包括綠色植物牆。

¹ 這是當時新建築物現行的能源與環境設計領袖標準。金級的得分在60-79分之間。新大樓獲得61分

室內空氣質素

二氧化碳（CO₂）、揮發性有機化合物（VOC）及微細懸浮粒子（PM_{2.5}）含量測量於2020年五月份的一天當房間不被使用時進行，從整個校園的大量房間採樣。根據香港的指導方針，二氧化碳水平「極好」，揮發性有機化合物水平「良好」；而微細懸浮粒子的水平在世界衛生組織建議的24小時水平範圍內（見145-149頁）。

清潔產品

我們評估了漢基所有使用的清潔產品的材料安全數據表。它們均不符合能源與環境設計領袖的運營及維護（O&M）標準，要求產品必須獲得一項或以上的國際公認環保標準認證，而某些產品包含對環境造成不良影響的成分。學校應轉向使用符合能源與環境設計領袖的運營及維護標準的清潔產品。



8. Curriculum

Coverage of sustainability in the curriculum was reviewed through a series of interviews with teachers, faculty heads and other staff involved with curriculum development in the Primary and Secondary schools, as well as with some Primary and Secondary students in various year groups.

The requirement for all teaching materials at CIS to be in Chinese and English presents a unique challenge for teaching about sustainability in the Primary school because the vocabulary for sustainability is more advanced in Chinese than in English, making it harder to introduce to young Chinese language learners. Nevertheless, there is consistent coverage of some aspects of sustainability throughout the Primary school. Most of this occurs in integrated studies, which examines human impacts through science and humanities, and Chinese language arts, which includes some nature-themed units every year. A range of outdoor activities and field trips complement Primary students' in-class learning about sustainability. The interviewed Primary students commented that these field trips were some of their most memorable sustainability learning experiences.

In the Secondary school, sustainability is primarily taught in science and individuals and societies (InSo) – subjects which all students take until the end of Year 10. Students may also elect to focus on sustainability within interdisciplinary units (IDUs) or other project-based learning opportunities in Hangzhou, and the school is trialling IDUs in Year 9.

Subject specialisation means that not all students leave CIS with the same level of eco-literacy.

The requirement for all teaching materials at CIS to be in Chinese and English presents a unique challenge for teaching about sustainability.

After Year 10, however, subject specialisation limits the proportion of students who continue to learn about sustainability. Geography and biology are the main DP subjects that cover sustainability but many students don't take these subjects. Consequently, the level of eco-literacy among graduates varies widely. The school should consider establishing a standard for the eco-literacy of its Primary and Secondary graduates and explore ways to assess it.

Notwithstanding the expressed desire of many teachers to teach *more* sustainability, time constraints and competing priorities are real limitations to doing more. If the desired outcome is graduates with the skills, attitudes and dispositions most likely to contribute to the creation of a sustainable future, a question that should be asked is what could be done *differently*? How can sustainability be integrated more effectively into the existing curriculum, and in all subjects not just a few? Leveraging the potential of the campus as a living laboratory is one approach that merits further attention. The school is also encouraged to reflect on how the “hidden curriculum” – the implicit, unintended messages conveyed by everything from building design to policies or the absence of policies, the extent of greenery or renewable energy on campus, and the school's daily operational practises – influences the students' attitudes and dispositions towards sustainability.

8. 課程內容

對課程內容的可持續發展覆蓋的評估通過一系列的訪問而進行，其中採訪了中小學的老師、學系主任和其他參與課程規劃的工作人員以及各個年級的部分學生。

漢基對所有教材都使用中文和英文的要求對有關可持續發展的教學提出了獨特的挑戰。在小學階段，因為中文的可持續發展相關詞彙與英文相比程度更高，使得向幼年的中文學習者介紹此話題的難度更大。雖然如此，小學課程對可持續發展的某些方面仍有保持連貫的教學。大部分教學發生在綜合常識中，該科目通過科學和人文研究人類的影響，以及中國語言藝術，其中每年會包括以自然為主題的單元。一系列的戶外活動和實地考察與小學生對可持續發展的課堂學習相輔相成。受訪的小學生評論說，這些實地考察是他們最難忘的可持續發展學習經歷之一。

在中學，可持續發展主要在科學及個人與社會 (InSo) 中教授，這是所有學生在完成十年級之前必讀的科目。學生亦可以在杭州選擇在跨學科單元 (IDU) 或其他專

學科專業化意味著並非所有學生都以相同的生態素養水平離開漢基。

漢基對所有教材都使用中文和英文的要求對有關可持續發展的教學提出了獨特的挑戰。

題研習中關注可持續發展，而學校在九年級正試用IDU課程。

但是，十年級之後，學科專業化限制了繼續進行可持續發展學習的學生的比例。地理和生物學是涵蓋可持續發展的主要文憑課程，但許多學生並不修讀這些科目。因此，畢業生的生態素養水平差異很大。學校應考慮為中小學畢業生建立標準並探索評估生態素養水平的方法。

儘管許多教師表示希望教更多可持續發展的內容，時間限制和需優先處理的工作事項在現實中限制了更多的教學工作。如果期望畢業生具備的技能、態度和意向在最大程度上有助於創造可持續發展，那麼應該問的問題就是可以採取哪些不同的方法。如何將可持續發展更有效地整合到現有的課程中，涵蓋在所有科目而非小部分？利用校園的潛力作為生活實驗室是一種值得進一步關注的方法。本報告亦鼓勵學校反思「隱藏的課程」——即從建築設計到政策或政策的缺失等所有事物傳達的無形、無意的資訊，校園中的綠色植物或可再生能源的範圍以及學校的日常運營操作——如何影響學生對可持續發展的態度及意向。



9. Community Engagement

The United Nations Sustainable Development Goals recognise that community engagement is an essential condition for sustainability and that sustainability is necessarily a community-based activity. Community engagement in schools can be characterised in terms of four models: (A) the school as an isolated island engaging solely with its own internal community, (B) the community invited into the school, (C) the school as a guest in the community and (D) the school as an agent of change in the community (see page 177).

CIS has a strong tradition of service to the community through a wide range of well-established service in action projects, CAS programmes and internships. Four of the 21 service projects currently offered have a sustainability focus, and three of them are DITO groups – urban farming, beach clean-up, and CIS Footprint. Most of the current service projects are examples of the first three models of community engagement.

In the fourth model, schools become agents of change in the community, identifying and addressing shared challenges and collaborating to solve problems to make the community a better place. This form of engagement is replete with authentic learning opportunities.

There is scope for deeper engagement of this kind between CIS and the community on sustainability-related issues – in particular with the neighbouring Quarry Bay School and St. Joan of Arc Secondary School on the shared challenges of food waste and composting, renewable energy, transportation, and waste and recycling (see pages 180 -181).

10. Governance and Decision-Making

For many *corporate* boards today, sustainability is a key strategic issue with clear implications for everything from cost structure and market share to branding and reputation, as well as a reporting and compliance requirement. However, it is not yet on the agenda of many *school* boards and leadership teams. Sustainability in schools, historically, has tended to be the minor province of student groups, individual staff and a few engaged parents, rather than a priority driven from the top.

There are signs this is changing, however. Leading schools in Hong Kong and around the world are making connections between their mission statements and sustainability, formulating and funding long-term strategies to become carbon neutral, adopting sustainability policies, and differentiating themselves on the basis of these initiatives.

The formation of a student-driven Sustainability Council with broad stakeholder representation will provide a more formal and participatory framework for sustainability decision-making at CIS. Membership of the Sustainability Council should include Primary and Secondary students, the Head of School, representatives from faculty, the Board, CISPTA and alumni, as well as from the procurement department, the finance department and the facilities management team.

This audit establishes a baseline for sustainability at CIS against which future progress should be benchmarked. Key performance indicators can now be established and should be monitored, and regularly and widely reported going forward.

9. 社區參與

聯合國的可持續發展目標承認社區參與是可持續發展的必要條件，而可持續發展必然是一項社區活動。學校的社區參與可分為四種模式：甲、學校為孤島，其互動僅限於內部社群；乙、學校邀請社區到訪；丙、學校為社區的訪客；丁、學校為社區變革的推動者（見177頁）。

漢基通過廣泛的行動服務項目、CAS計劃及實習機會，維持著深厚的社區服務傳統。目前提供的21項服務項目當中，有四項以可持續發展為重點，而其中三項均是DITO的團體——「都市農業」、「海灘清理」和「漢基足跡」。目前的服務項目多數是前三種社區參與模式的例子。

第四種模式中，學校成為社區的變革推動者，確認及應對共同的挑戰並合作解決問題以建設更美好的社區。這種參與充滿了實實在在的學習機會。

漢基與社區在可持續發展相關議題上仍有更深入互動的空間，尤其是與附近的鰂魚涌小學和聖貞德中學，一同解決食物浪費與堆肥、可再生能源、交通以及廢物與回收方面的共同挑戰（見180-181頁）。

10. 治理與決策

對於當今許多的董事局而言，可持續發展是關鍵的策略性問題，對從成本結構和市場份額到品牌和聲譽各個方面都有很清晰的影響，並且需要符合申報和合規標準。但它尚未列入許多學校董事局和領導團隊的會議議程。學校裡可持續發展歷來只是學生組織、個別老師以及幾個家長較小的關注點，而不是從高層推動的優先重點。

不過，有跡象表明這正在改變。香港以及全球各地領先的學校將可持續發展與他們的宗旨相結合，制定並資助長遠的碳中和計劃，實施可持續發展政策，並基於這些措施突出自己學校的與眾不同。

設立由學生推動並具有廣泛持份者代表性的可持續發展委員會將為漢基的可持續發展決策提供更規範和參與式的框架。可持續發展委員會的成員應包括小學和中學生、校長、老師，還有來自董事局、漢基家長會和校友以及採購部門、財務部門和設施管理團隊的代表。

此審計為漢基可持續發展的未來進展奠定了基準。學校現可設立並觀察關鍵的績效指標，往後進行定期並廣泛的報道。



11. Communication

Communicating about sustainability in a way that engages hearts and minds, supports behaviour change and facilitates the development of a sustainable community is a challenge that sometimes confounds even the world's leading communications strategists and behavioural psychologists. Done well, it fosters alignment and accelerates transformation; but it also has the potential to be counterproductive.

Key elements of an effective communications campaign include a call to action, a strategy for engaging with new audiences outside the "sustainability echo chamber," an opportunity for dialogue, and an assessment of effectiveness.

CIS Footprint formed a dedicated team to communicate to their peers about the audit and its findings through a variety of channels including Instagram, a dedicated webpage, school-wide emails, a feature in the student magazine, Xiaohua, posters, and in-person events (see pages 204-207). The students also collaborated with the CIS Communications Department to reach a wider audience (see pages 210-213).

The school is encouraged to develop a detailed communications strategy to support its short and long-term sustainability objectives.

12. The future we want

Following a peer-to-peer presentation of the audit's findings at a workshop to mark the conclusion of the audit in June 2020, fifty students and staff were invited to envision a future sustainable CIS – the CIS of 2033, the year of the school's 50th anniversary.

The future CIS they imagined has responded proactively to the concerns they identified in the 2019-2020 audit and has become a model sustainable community. In 2033, the Moongate

Students imagined the CIS of 2033 to be a school that has become a model sustainable community.

continues to welcome visitors to campus, but almost everything else has transformed – Braemar Hill is vehicle free, the campus is an oasis of native species and vertical farms of edible produce, buildings have been retrofitted or purpose-built to harness renewable energy, waste is a thing of the past, the food cycle is circular, and the air is clean. The students' visions are articulated in letters they wrote to themselves, a selection of which can be found on pages 234-251 of the full report and the rest are available on [DITO's website](#).

Conclusion and Next Steps

The sustainability review has highlighted key areas for improvement in ten aspects of CIS's operations. A table of the review's 100+ recommendations can be found on pages 254-260.

The audit has also amplified student engagement in sustainability at CIS and provided new opportunities for leadership and authentic learning. As one member of staff remarked: "I can't think of more important work for our students to be doing."

To develop this further, the school is encouraged to consider the place of sustainability in its next strategic plan.

11. 宣傳

以一種使人真心支持、促進行為改變並引導可持續發展社區的發展的方式進行有關可持續發展的交流是一項重大的挑戰，有時甚至困擾世界領先的通訊策略家和行為心理學家。若發揮作用可促使各方達成共識並加快變革，但亦有可能適得其反。

有效的宣傳活動的關鍵要素包括行動呼籲、針對吸引「可持續發展迴聲室」外的受眾的策略、對話的機會以及效力評估。

「漢基足跡」設立了專職小組，通過各種媒介向同學展示審計結果，包括Instagram、專設網頁、全校電郵、學生雜誌中的專欄、《校話》、海報以及實體活動（見204-207頁）。學生們亦與漢基傳播部門合作，以觸及更廣泛的受眾（見210-213頁）。

本報告鼓勵學校制定詳盡的傳播策略以支持其短期及長期可持續發展目標。

12. 我們對未來的憧憬

2020年六月的工作坊中，學生向他們的同學報告了審計的結果。隨後，50位學生與老師獲邀一起構想漢基於2033年創校五十週年時的可持續發展未來。

學生想像2033年的漢基成為了可持續發展社群的最佳典範。

他們想像未來的漢基積極回應了2019-2020年審計指出的問題並成為了可持續發展社群的最佳典範。2033年，「月拱門」仍舊迎來訪客，但學校的面貌已幾乎完全改變：寶馬山沒有車輛出入、校園長滿當地植物並使用垂直農場種植食物、建築物被翻修或專門建造以利用可再生能源、廢物已成往事、食物生產過程變得循環式而空氣也很清新。學生寫給自己的信件體現出他們的願景，您可在完整報告的234-251頁查到部分學生的來信，而其餘信件已刊登在DITO的網站上。

結論及下一步行動

可持續發展評估強調了漢基營運在十個方面有待進步的關鍵領域。您可於254-260頁參閱表格中列出的一百多項建議。

這次審計亦加深了學生對漢基可持續發展的投入程度並提供了新的領導及學習機會。正如一位教職人員所述：「我認為學生（在審計中）做的一切工作無比重要。」

本報告倡導學校思考可持續發展在修訂遠景規劃中的定位，以進一步展開這方面的工作。





CIS FOOTPRINT
DROP IN THE OCEAN x SUSTAINABILITY AUDIT



metanoia
sustainability in schools

