



เรียนรู้เพื่อรับใช้สังคม



To Pursue Knowledge to Serve Society

HUACHIEW
CHALERMPRAKIET
UNIVERSITY



SUSTAINABILITY REPORT 2021

Clean, Green, Lean and Self-supporting University
Sustainability University
Lifelong University
Niche University
Guiding Principle: *To Pursue Knowledge to Serve Society*



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BASIC INFORMATION

University Motto on Sustainability

Bio Circular, Clean, Green and Sustainable University

Name of University : Huachiew Chalermprakiet University

Business Address : 18/18 Debaratana Rd. Km.18, Bang Phli, Samut Prakan 10540

Executive Summary

Huachiew Chalermprakiet University opened in 1992. The university has 886 staff many of whom have been working with the university from its early days. The university working days are from Monday to Saturday (3,744 hours per year). Aside from maintaining full-teaching operations, the university also strives to have impeccable green credentials through a low energy consumption profile.

From 2012 to the present, the university has engaged in an energy saving program and this has resulted in reduced energy consumption. To achieve the goal of energy efficiency, Huachiew Chalermprakiet University has created a culture of energy saving in all levels of university operations. We have encouraged employees to be personally involved in energy conservation activities. There are team members, who lead the campaign to reduce the carbon footprint. It started with energy conservation training for every staff so they could guide others and apply their know-how and skills in their working routines. We also encourage students to join the campaign by using energy economically, during student activities within the university. Then there are also ongoing outreaches to the community. Activities are conducted to educate students about energy saving as part of our corporate social responsibility program.

For the past years through energy conservation activities (both investment and non-investment), we have reduced energy consumption by around 3,000,000 kWh, which is equal to around 2,000 tons of CO₂ emissions. The reduction of energy consumption gave us a total savings of over 15 million baht with the average ROI of 3.37 per year. As a result of our strong commitment towards promoting a sustainable, greener, and cleaner environment, Huachiew Chalermprakiet University was awarded the **Best Energy Saving Building of MEA 2015 by the Metropolitan Electricity Authority (MEA) of Thailand with prize money of 2 million baht.** Also, we were honored at the **Thailand Energy Awards 2016 and ASEAN Energy Award 2016.**

Recently, our sustainability effort has been recognized further, so that in 2021, **the university has been awarded again the best practice in Energy Saving Building conducted by MEA**, which strongly indicate that our efforts sustainability efforts and projects are indeed sustainable and long-term. Moreover, to show our strong commitment to report our sustainable activities to the world, Huachiew Chalermprakiet University has signed in 2021 the SDG Accord, which is facilitated by the Global Alliance, EAUC (the Alliance for Sustainability Leadership in Education) and HESI (Higher Education Sustainability Initiative) as shown by the image below.



Figure 1 The SDG Accord

A culture of energy saving was not easy to create but at Huachiew Chalermprakiet University, **WE CAN**. It is our firm belief that our success story is driven by our staff, our students, our lecturers, and the members of the administration who are deeply committed to the university’s sustainability programs.

The Huachiew Chalermprakiet University Sustainability Report 2021 is divided into two main sections. Section 1 discusses the Introduction and Historical Background. This section includes the university’s inspiration in aiming towards a sustainability university, the university’s energy conservation virtue, the organizational structure of our sustainability projects and the awards received. The Section 2 reports the activities and projects as well as conducted by the Huachiew Chalermprakiet University in the academic year 2021. The subsections include reports in the (1) Setting and Infrastructure, (2) Energy and Climate Change, (3) Waste, (4) Water, (5) Transportation, and (6) Education and Research.

Section 1 Introduction and Historical Background

1.1 The Inspiration

From His Majesty the Bhumibhol Adulyadej’s (King Rama IX) words in June 24, 1994,

“May you manage the university along the path of righteousness”

we reminded ourselves in thinking, speaking and doing to follow our King’s words. We aimed to apply his words in conducting sustainability projects.



Figure 2 The auspicious opening ceremony by H.M. King Bhumibol Adulyadej

1.2 The Strategy

Participation and proper communication to all stakeholders are the heart of success in any sustainability-related tasks at Huachiew Chalermprakiet University. Our achievements in addressing the UN’s Sustainable Development Goals (SDGs) originated from the strong commitment, clear policies and strategies developed by the top executives, deans, directors and managers, joined by our staffs, students and other government and non-government organizations, and the eventual communication of these policies and strategies to all people involved. These various parties have driven sustainability policies and activities, and then eventually became Huachiew Chalermprakiet University’s sustainability culture.

Thus, in order to reach our sustainability goals, Huachiew Chalermprakiet University had announced sustainability policies and established organizations to drive these policies and do actions that drives sustainability. These organizations were established from every level of Huachiew’s staffs, supported by sufficient funding from the university with continuous evaluation and development. For instance, when we conduct and host sustainability activities participations from every level of Huachiew Chalermprakiet University’s people is enjoyed. Some of these projects are the “Bike, Grow, Save” and Research to Innovation (R2I) Projects, Sustainable Community Project, Sustainable Arts and Culture Festival, Sustainable Research, and many more will be shown in Section 2.



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1.3 Employee Development and Educational Training

At Huachiew Chalermprakiet University, we have continuously educated our people in regarding our sustainability goals. Focusing on every level of our staffs and students, our people had a clear understanding about sustainability policies and activities, which will lead to firm sustainability awareness. In order to do so, we invited specialists in sustainability from the SUN Thailand and sustainability keynote speakers and consultant in our international conferences to educate and train our people in fulfilling our sustainability goals. We also observed and learned from other successful organizations and brought and applied that knowledge to our organization; some of them can even be applied at our staff's house.

1.4 Smooth Transition of Administration

Since the beginning of the university's shift towards sustainable, clean and green practices in the year 2013 Huachiew Chalermprakiet University under the administration of Assoc. Prof. Dr. Prachak Poomvises (former President), the current administration under Assoc. Prof. Dr. Uraipan Janvanichayanont, has not only continued our best sustainable practices but has reviewed the policies to make sure that these best sustainable practices run continuously, smoothly, and covers all departments and faculties of the university. To have a global impact, we have developed our activities from local to international and harness the lessons from these experiences to continually improve and develop our sustainable practices.



Section 2 Sustainability Metrics

2.1 Setting and Infrastructure (SI)

Huachiew Chalermprakiet University is a comprehensive university located in the eastern suburb of the capital city of Bangkok. The climate of the region is generally tropical wet and dry. Huachiew Chalermprakiet University has two campuses: Bangplee Campus and Yossey Campus. For sustainability assessment purposes, only the main campus (Bang Plee Campus) located in the province of Samut Prakarn is included

The Bangplee Campus has a total area of 400,114 m². Built in 1992, it consists of two large areas: HCU1--with an area of 344,000 m², and HCU2--with an area of 56,114 m². The university's main campus is located in Bang Phli District, Samut Prakarn. It's a suburban area surrounded by many communities and industrial plants. Huachiew Chalermprakiet University is a private institution with 12 Faculties and 1 College:

- Faculty of Nursing
- Faculty of Social Work and Social Welfare
- Faculty of Liberal Arts
- Faculty of Business Administration
- Faculty of Science and Technology
- Faculty of Public Health and Environment
- Faculty of Communication Arts
- Faculty of Pharmacy
- Faculty of Medical Technology
- Faculty of Physical Therapy
- Faculty of Traditional Chinese Medicine
- Faculty of Law
- College of Chinese Studies

The university focuses on having a green atmosphere and spaces within the university to provide students and staff with a good quality of life by living in a beautiful environment with good air quality. Moreover, the university places great emphasis on reducing all kinds of pollution and at the same time increasing energy conservation both inside and outside the university's buildings. The university emphasizes the activities that everyone can participate in. For example, the university's White Bike Project, which allows everyone to ride the university's white bikes on the campus for free, and the Free Parking Zones. In addition to attempting to reduce the amount of garbage, the university has committed itself to conducting research on environmental sustainability for the benefits of the community.



Figure 3 Top view of the main campus

The university has a total open space area of 351,871 m². The ratio of open space area to total area is equal to 87.94%.

HCU1 has a total open space area of 305,940 m², and HCU2 has a total open space area of 45,931 m². The names of the open space areas at HCU 1 and HCU 2, where the university's uses/activities are as follows:

Table 1 HCU Space area

Open space name	Total area (m ²)	Duration (in Hours per Weeks)
A=Activity Area	1,430	70
B =Health Garden	2,780	70
C=Huachiew University Stadium	9,687	25
D= Multipurpose Sports Ground	2,145	70
E= Football Field 2	6,630	70

The major open spaces of the university include:

1. Activity Area (Lan Dao) has an area of 1,430 sq m. It is used for outdoor activities for students. The area is flat, open-air, and quite spacious.
2. Health Garden has an area of 2,780 sq m. It is a public park and has a lot of shades. It is also a place for students and staff to exercise and relax.
3. Huachiew University Stadium (Main Stadium) is a large sports complex consisting of 1 standard size football field, 2,000-seat amphitheater building, multi-purpose Building and a large field used for various university activities such as football matches and other sport competitions.
4. Multipurpose Sports Ground is a facility designed for students to play basketball and Volleyball, etc.
5. Football Field 2 is an open-air lawn which is used for sporting events and recreation.



Figure 4 The activity area (above) and health garden (below)



Figure 5 Multipurpose sports ground (above), open field (middle) and forest vegetation area (below)

Huachiew Chalermprakiet University Banglee Campus (HCU1 & HCU2) has a total area covered in forest vegetation of 63,314 m². The ratio of the area covered in forest vegetation to the total area is 15.82%. The forest vegetation area of HCU1 is 61,239 m². The forest vegetation area of HCU2 is 2,075 m²

Green areas (Forest vegetation) such as health gardens are small parks where many kinds of large trees are planted. There is also a pond in the park, making the atmosphere shady and pleasant. Additionally, there is a small road around the garden for walking and exercising.

Lastly, there are outdoor exercise equipment which can be used by students without charge.

To manage the green spaces of the university, there is a plan to plant trees to replace dead ones or damaged ones. The plan is implemented annually to keep the university green and shady all year round

In early 2022, the university has activities to increase green areas such as tree planting activities of administrators, students and staff together planting trees to increase green space within the university on July 27, 2022. The green space management of the university will have a tree planting plan to replace dead or damaged trees as an annual plan to keep the university green all year.



Figure 6 Tree planting activity



Table 2 HCU budget

	2019	2020	2021	Average
Budget Total (in US Dollars)	14,734,984	13,899,084	13,399,219	14,011,096
Sustainability Budget (in US Dollars)	672,560	495,265	642,211	603,345
			Percentage	4.31

The average annual university budget for infrastructure, facilities, personnel, research, and other expenses related to sustainability efforts over the past three years was \$603,345, representing 4.31% of the total budget.

In the academic year 2021, the university has allocated more budget for sustainable development. And the percentage of the sustainable development budget to the university's total budget was increased from the academic year 2020 by the total of 3.56 percent.

The university has a plan to maintain equipment and systems in every building, and make it a regular plan which must be carried out yearly. There is a unit, such as the Building Division, directly responsible for the maintenance of all internal systems in the building. The university also hires a private company that specializes in building maintenance to take care of the building and repair related equipment so that all systems in the building are always in good working condition.

To make the plan effective, the unit or company responsible for maintaining all systems will develop an annual maintenance plan, and inspect the performance of all systems in the building to ensure that it is operational at all times. If there is a damage or malfunction to the system or equipment in the building, the user can notify the responsible units to repair the such system and equipment. In case of urgency, University Hotline consisting of representatives from all faculties and departments can be used in order to take an immediate corrective action.

The notification will also be done via the university's repair notification system to collect information about system repairing of the university. This record is useful since the repairing history will be used as a supplementary information to help improve equipment and systems maintenance in the building in the long term. The university has 4 systems that must be maintained as follows:

1. electrical system
2. sanitation system
3. air conditioning and ventilation systems
4. fire extinguishing system and fire alarm system

The total maintenance area is 187,603 square meters, accounting for 100% of the total indoor area. The details of maintenance for each building are as follows:

**Table 3** Building maintenance

	Building Names	Total operation and maintenance building area (m²)	Building Systems	Frequency of maintenance building
1	Study Buildings	35,940	E, F, A, S	D, M, Y
2	The Auditorium	3,896	E, F, A, S	D, M, Y
3	The Library	8,800	E, F, A, S	D, M, Y
4	The Five-Story Science Laboratories Building	4,772	E, F, A, S	D, M, Y
5	The Cultural Center	4,502	E, F, A, S	D, M, Y
6	Storehouse	488	E, F, S	D, M, Y
7	The Services Building	2,370	E, F, A, S	D, M, Y
8	Administration Building	10,735	E, F, A, S	D, M, Y
9	Maintenance Building	846	E, F, A, S	D, M, Y
10	The Cafeteria 2 Building	2,470	E, F, S	D, M, Y
11	Stadium	2,162	E, F, A, S	D, M, Y
12	The Multi-Purpose Building	1,863	E, F, A, S	D, M, Y
13	Student Dormitory 2	4,355	E, F, A, S	D, M, Y
14	Student Dormitory 1	5,485	E, F, A, S	D, M, Y
15	Student Dormitory 3	8,200	E, F, A, S	D, M, Y
16	Tang Jew Building	1,312	E, F, A, S	D, M, Y
17	Chin Sophonpanit Building	4,060	E, F, A, S	D, M, Y
18	Teacher Dormitory	3,062	E, F, A, S	D, M, Y
19	The Cafeteria 1 Building	4,705	E, F, S	D, M, Y
20	The Four-Story Activity Building	508	E, F, A, S	D, M, Y
21	HCU Savings Cooperative Building	122	E, F, A, S	D, M, Y
22	Building 1	16,660	E, F, A, S	D, M, Y
23	Building 5	10,090	E, F, A, S	D, M, Y
24	Building 6	10,090	E, F, A, S	D, M, Y
25	Building 7	10,090	E, F, A, S	D, M, Y
26	Building 8	10,339	E, F, A, S	D, M, Y
27	Building 9	8,943	E, F, A, S	D, M, Y
28	Building 10	10,738	E, F, A, S	D, M, Y
	Total	187,603		

NOTE: E = electrical system, F= fire extinguishing system and fire alarm system , A = air conditioning and ventilation systems , S = sanitation system, D= Daily, M= monthly, Y=yearly

The results of inspections and the maintenance of various building systems are presented to the university committee every month. A report summarizing such results is also made and submitted.



Figure 7 Meeting to report the results of inspection and maintenance of all building systems

In terms of classroom management, the university uses classrooms for many purposes including teaching, meetings, and laboratories. There are guidelines which contain rules and methods for using different rooms. Such rules are normally in a university announcement and available in public for acknowledgement. Furthermore, the university conducts indoor cleaning in many areas, such as school desks in classes, offices, and common areas. They are daily cleaned with disinfectant.

Before the opening of teaching at the university after the closure due to the Covid-19 epidemic situation, disinfectants are sprayed in offices and classrooms. Cleaning staff will be tested for covid infection before working to ensure cleanliness and free from germs. Every building has a temperature scanner and hand sanitizer with alcohol gel before entering the building. In addition, there is a board to campaign about the COVID situation and how to be safe from COVID when staying indoors.

Campus facilities for the disabled, special needs and/or maternity care



Figure 8 Accessible toilet



Figure 9 Ramps, parking, and handrails for the disabled

In addition, the university also prioritized and provided necessary facilities for people with disabilities both indoors and outdoors, for example handicapped bathrooms with steel rails to support the use of the bathroom for the disabled people, ramps outside the buildings for people with disabilities to get in and get out the buildings easily in canteens, education buildings, library, and other areas. Plus, for providing their convenience, there are parking lots for disabled people with signs indicating disabled parking area which is located near the entrances to the buildings.

Security and safety facilities (SI.9)



Figure 10 CCTV facilities



Figure 11 On campus security guards



Figure 12 Emergency alarm button and engine fire pump



Figure 13 Fire extinguisher, fire hydrant, and fire department connection

Huachiew Chalermprakiet University provides security systems all over the campus areas for students, staff, and the university’s property. The systems include the following provisions.

1. CCTV cameras are installed at all entrance and exit points, each floor of every building, all campus areas as well as the main gates.
2. The security guards are on duty in shifts for 24 hours to provide safety to students, staff, and the university’s property. The guards are on duty at the main gates, buildings’ entrance and exit, and the marked points all over the campus.
3. Fire prevention and suppression equipment such as Fire Control Cabinet, Emergency Alarm Button, Fire Extinguisher, Engine Fire Pump, Fire Hydrant, and Fire Department Connection are installed both inside and outside the building. The equipment is in a good condition and the staff was trained in basic fire suppression training. In addition, the fire protection system will always be checked for use, and in the case of fire, the system must be operational within 10 minutes and must be able to prevent incidents for more than 10 minutes.

Health infrastructure/facilities for students' and academic and administrative staff' wellbeing (SI.10)



Figure 14 Huachiew Chalemprakit University Clinics

Huachiew Chalemprakit University provided medical services to students, university staff and public such as Hua Chiew Traditional Chinese Medicine Clinic, Modern Medicine Clinic and Medical Technology Laboratories. There are certified doctors and nurses from well-known and recognized institutions of each profession working at the clinics (Certified personnel are available). In case that the patient is in a serious condition, the patient will be coordinated and transferred to Bangplee Hospital.



**หลักสูตร
เคล็ดลับอายุวัฒนะ**
สุขภาพกายสุขภาพจิตแข็งแรง

บรรยาย และ WORKSHOP
ที่มหาวิทยาลัย
วันที่ 4-5 ต.ค. 65

2,000 บาท

สนใจสอบถามข้อมูลเพิ่มเติมได้ที่ เฟสบุ๊คเพจ "คณะการแพทย์แผนจีน ม.หัวเฉียวฯ" หรือโทร 02-312-6300 ต่อ 1108,1519

**หลักสูตร
เปิดโลกสมุนไพรจีน
ขุมทรัพย์จากธรรมชาติ**

- บรรยาย และ workshop ที่มหาวิทยาลัย
- วันที่ 26-27 ต.ค. 65

2,500 บาท

สนใจสอบถามข้อมูลเพิ่มเติมได้ที่ เฟสบุ๊คเพจ "คณะการแพทย์แผนจีน ม.หัวเฉียวฯ" หรือโทร 02-312-6300 ต่อ 1108,1519

Figure 15 Huachiew Chalermprakiet University Clinics

The university has conservation projects in long-term conservation facilities, including the Organic Vegetable Project. This project is a non-chemical and pesticide-free vegetable growing project. All kinds of vegetables in this project are grown by the university's staff and grown in the university area. The project has been operating since 2018. Food crops are grown for cooking food as well as Thai and Chinese herbs which are grown for selling to people and communities. The project has been carried out continuously until now and a wide variety of plants are grown every year. The organic vegetable project sells products and increases the income of the university as well as the health of the university staff by providing them with no chemical and hazard free fruit and vegetable.



Figure 16 Learning Promotion Project for Birds and Sustainable Bird Conservation in Huachiew Chalmprakiet University (HCU)

In addition, the university has an additional program on the promotion of animal conservation. The project started from 2022-2024, the project name is Learning Promotion Project for Birds and Sustainable Bird Conservation in Huachiew Chalmprakiet University (HCU). The total duration of the project is 3 years. The reasons for the implementation of this project from the survey and data collection on the number of bird species found at Huachiew Chalmprakiet University, it revealed that various kinds of bird species, both resident and migratory are found on campus. These birds can indicate the fertility of nature and the presence of relatively high green spaces. Birds are also an important part of the ecosystem as they contribute to the transfer of nutrients in this ecosystem. Thus, creating sustainability of the ecosystem and green spaces of the university.

2.2 Energy and Climate Change

Huachiew Chalmprakiet University strives to realize the use of additional energy saving appliances by paying close attention to efficient energy management in all parts of the organization. The contract with TW Facility Service Co., Ltd. provides care and maintenance of the electrical systems, air conditioning systems, etc., in order to achieve potential and efficient energy saving system with the use of devices such as LED lamps and fans as replacement of the existing ones. Moreover, our equipment storage room are always equipped



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energy efficient appliances. The most used appliances in our university had electricity saving label No.5 certification of Ministry of Energy (Thailand) and EGAT as energy efficient appliances with a Thailand’s standard.

A comparison of the number of energy-efficient appliances and conventional ones, the percentage is 83.

Table 5 Energy-efficient appliances at HCU

Appliance	Total Number	Total number energy Efficient appliances	Percentage
Huachiew Chalermprakiet University, Area 1 (HCU 1)			
1. LED Lamp	33,139	27,600	83%
2. Fan	1874	260	14%
3. Split Type Air Conditioner (SPT)	1,176	315	27%
4. Small air cooler unit (FCU)	128	0	0%
5. Large air cooler unit (AHU)	17	0	0%
Huachiew Chalermprakiet University, Area 2 (HCU 2)			
6. LED Lamp	10,013	10,013	100%
7. Split Type Air Conditioner (SPT)	958	958	100%
8. Fan	138	138	100%
SUM	47,443	39,284	83%

Source: TW Facility Service Co. Ltd.

The following formula is applied for the calculation:

$$\frac{\text{total smart building area}}{\text{total building area}} \times 100\%$$

***Total Building Area: 48,243 m²**

$$\frac{33,873 \text{ m}^2}{48,243 \text{ m}^2} \times 100\% = 70.21\%$$

Huachiew Chalermprakiet University uses the Building Management System (BMS) that entails using the Lighting Access Control system, which can control the lighting system outside the building from the control room, the auto light power on-off system, the surveillance with CCTV, and a BAS system for controlling Chiller etc. All these systems are controlled by a computer operating system. there is total smart building of 33,873 m² (from total building area of 48,243 m²).

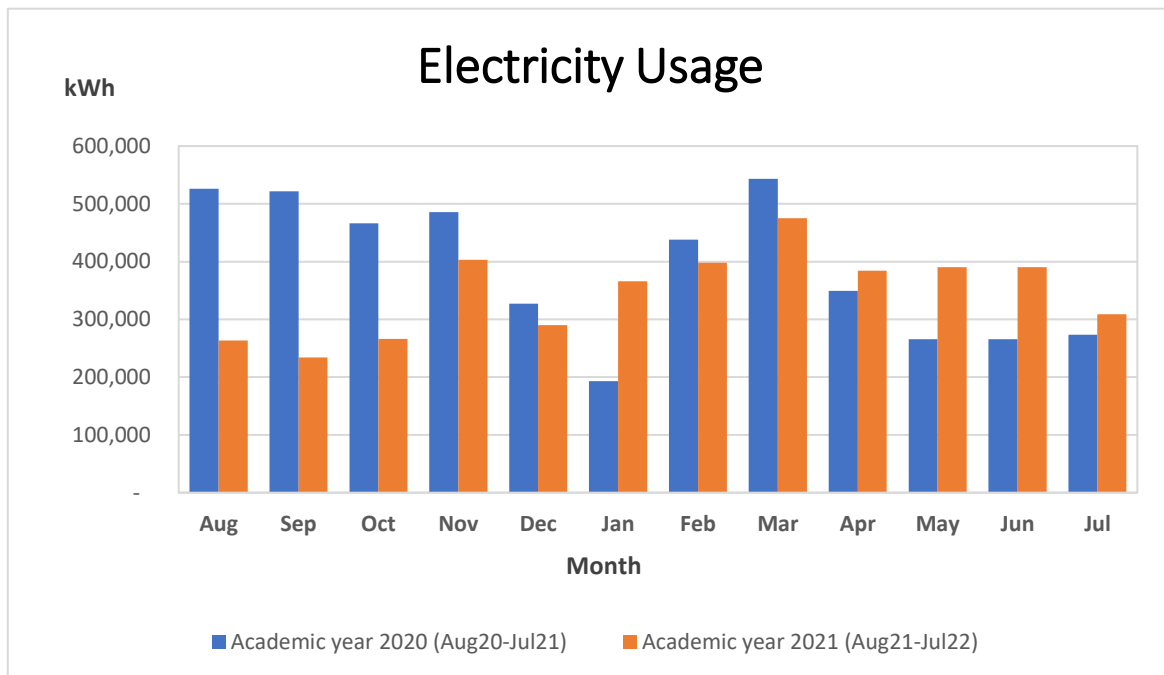
As for renewable energy sources in campus, the University has implemented the HCU Solar Rooftop project by installing solar panels on the roof of the Lecture Building, Canteen 1 and Gymnasium (Power Purchase Agreement with Solar Energy Society Co., Ltd. on July 2, 2020). Therefore, it is self-assessed at one source, which is Solar power. It is one renewable energy source. The solar power capacity is 829.44 kW. In 12 months, the solar power generation is 3,583,180.80 kWh (829.44 kW. x 12 hr x 30 days x 12 months).



Photos by Krissada Boonmee

Figure 17 HCU Solar Rooftop Project

The total electricity consumption of Huachiew Chalermprakiet University in the past 12 months (in academic year 2021, from August 2021 to July 2022), which was used for lighting, cooling, heating, laboratory equipment and etc equals to 4,140,073 kWh or 551 kWh per person. From Figure 18, the ratio of renewable energy production can be divided by total energy usage per year which yields 86.5%.



Academic year 2020 (Aug20-Jul21)

Month	Electricity usage (in kilowatt hours)		
	HCU 1	HCU 2	Total
Aug-20	388,000	138,100	526,100
Sep-20	387,000	134,700	521,700
Oct-20	326,000	140,300	466,300
Nov-20	361,000	124,500	485,500
Dec-20	237,000	90,000	327,000
Jan-21	116,000	77,000	193,000
Feb-21	328,000	110,000	438,000
Mar-21	395,000	148,000	543,000
Apr-21	230,000	119,524	349,524
May-21	162,000	103,790	265,790
Jun-21	187,000	103,036	265,790
Jul-21	176,000	97,375	273,375
Total	3,293,000	1,386,325	4,679,325

(Source: Building Division, Huachiew Chalermprakiet University)

Academic year 2021 (Aug21-Jul22)

Month	Electricity usage (in kilowatt hours)		
	HCU 1	HCU 2	Total
Aug-21	168,000	95,587	263,587
Sep-21	161,000	73,000	234,000
Oct-21	187,000	79,000	266,000
Nov-21	318,000	85,000	403,000
Dec-21	212,000	78,000	290,000
Jan-22	272,000	94,000	366,000
Feb-22	302,000	96,000	398,000
Mar-22	364,000	111,000	475,000
Apr-22	292,000	92,000	384,000
May-22	293,048	97,011	390,059
Jun-22	242,000	119,427	390,059
Jul-22	202,000	107,000	309,000
Total	3,013,048	1,127,025	4,140,073

(Source: Building Division, Huachiew Chalermprakiet University)

Figure 18 Electricity usage (kWh) of Huachiew Chalermprakiet University in the past 12 months



The university has a policy and committee to develop plans to drive activities/projects and various operations for conserving energy and environment. Huachiew Chalermprakiet University focuses on creating an environment with green spaces, good ventilation, use of natural light, and reducing all types of pollution within the university for students and staffs to have a good quality of life. Operations related to construction and renovation reflect the policies of the university such as:

1. Energy and Environmental Conservation Policy (Notification No.026 / 2022)
2. Appointment of Energy and Environmental Management Committee (Order No.302 / 2021)
3. Use of label No.5 certification as green label of Ministry of Energy (Thailand) and EGAT as energy efficient appliances with a Thailand's standard and other energy-efficient appliances such as LED lamps, fans, split type air conditioner (SPT)
4. Green library implementation, building learning spaces as a new area in green library for use of natural light and saving energy.
5. HCU Solar Rooftop Project
6. MEA Energy Awards 2021, which was obtained from the energy-saving building contest. Previous awards garnered by the university includes The Best Energy Saving Building of MEA 2015 by the Metropolitan Electricity Authority (MEA) of Thailand with prize money of 2 million baht, and the Thailand Energy Awards 2016 and 2020, and ASEAN Energy Award 2016.
7. Green space between buildings for relaxation purposes

Greenhouse gas emission reduction program, Huachiew Chalermprakiet University's programs aimed to reduce all three scopes emissions (Scope 1, 2 and 3) as following activities:

Scope 1: Mobile combustion

1. HCU - White Bicycle Project.
2. Project on service by HCU electricity cars.
3. Program on determination of a motorcycle parking zone at the front gate of our university (Motorbike driving is prohibited within Huachiew Chalermprakiet University.).

Scope 2: Purchased electricity

4. Huachiew Chalermprakiet University has Solar Rooftop project to install solar panels on the roof of the Lecture building, Canteen, and Gymnasium. The total capacity is 829.44 kW, and within 12 months production capacity equals 3,583,180.80 kWh.

Scope 3: Commuting, Waste, and Others

5. HCU Carpool.
6. HCU Library participating in individual carbon offsets with Thailand Greenhouse Gas Organization (Public Organization) or TGO through the Green Library Network by calculating various energy consumption of staff in the library to be aware of social responsibility and compensation according to actual power consumption since the university cooperated in 2019 to present.
7. We had developed the 2nd year of Routine to research (R to R) project for reducing CO2 emission by reducing the use of black HPDE plastic bags (garbage bag) in garden service,



gasoline (as fuel) for leaf waste trucks, producing fertilizer from leaf waste, and use it to improve soil and nourish plants and trees. It was found that the use of black bags and gasoline was clearly reduced and the estimated of the amount of greenhouse gases was decreased (unit in kgCO₂). As a result, it can help to reduce global warming.

8. Chom Nok Chom Mai Project (to ride white bicycle, see birds and grow trees around university)
9. No Foam Campaign in Huachiew Chalermprakiet University
10. Paperless Campaign in HCU office
11. The improvement of the list of activities on the "Ecolife Application" with the manufacturer to change from the original for use in resource and energy conservation activities (which is a specific activity of Huachiew Chalermprakiet University only) in addition to the original activities such as plastic reduction activities, tree planting activities and volunteer activities

The university's total carbon footprint (CO₂ emission in the last 12 months) was 4,181.78 metric tons divided by total population (7,518 persons) yielded 0.56 metric tons per person.

For the number innovative program(s) in energy and climate change, the university employs seven programs. Our innovations that emerge involve saving energy and resources in order to participate to mitigating global warming and climate change. These seven innovations represent the reduction of student's fuel consumption for traveling from home to university, the reduction of paper use, the reduction of daily plastic use and environmental protection, and environmental conservation which include the following details:

1. The invention of the watering bike in HCU health park by Building Division.
2. Purchasing a license and developing of "HCU asset program version 1.0.1 and its QR code readers and recorders" to count university's equipment and assets by Materials and Supplies Department.
3. The development of digital transcripts by the graduation department, Registry and Processing Office.
4. The development of the Employee self-service (ESS) program by the Human Resources Division, allowing university staff to access and edit their personal information by themselves. It also simplifies the process and reduces interpersonal contact in coordinating requests for information.
5. The improvement of the list of activities on the "Ecolife Application" with the manufacturer to change from the original for use in resource and energy conservation activities (which is a specific activity of Huachiew Chalermprakiet University only) in addition to the original activities such as plastic reduction activities, tree planting activities and volunteer activities.
6. Development of a real-time status display for dormitory students by the student dormitory department.
7. Developing a system for checking the process of student loans by the education loan department.

Examples of these innovative programs are shown below



Figure 19 Digital transcript (above) and EcoLife (below)

Impactful university programs on climate change, Huachiew Chalermprakiet University joined the project with the Thai Health Promotion Foundation, which was under the cooperation of NODE Samut Prakan in the waste separation project. We received a fund of Thai Health Promotion Foundation for the 2nd year (in June 2021 – May 2022). This project is to develop the community around the university to have a green area and provide them a sustainable development in waste management within the community which is a part of helping to reduce greenhouse gas emissions.



Figure 20 Waste management project with Baan Eua Athon Bangna 1 community, Samut Prakan, Thailand (Received a fund of Thai Health Promotion Foundation for the 2nd year in June 2021 – May 2022)

2.3 Waste

Huachiew Chalermprakiet University (HCU) has strategic objectives to be the sustainable and green university in accordance with Sustainable Development Goals (SDGs) of the United Nations. Hence, the university aims at building a culture of good practice in continual conservation of energy and environment.

The waste management at HCU classified waste into three groups: (1) organic waste, (3) inorganic waste, and (3) toxic waste. Waste management is carried out by following the process guidelines according to 3R principle: **Reduce, Reuse, Recycle**. Reduce means to minimize the amount of waste we create. Reuse refers to using items more than once. Recycle means putting the waste to a new use instead of throwing it away.

Organic waste

All organic waste was used for treatment/re-use as follows:

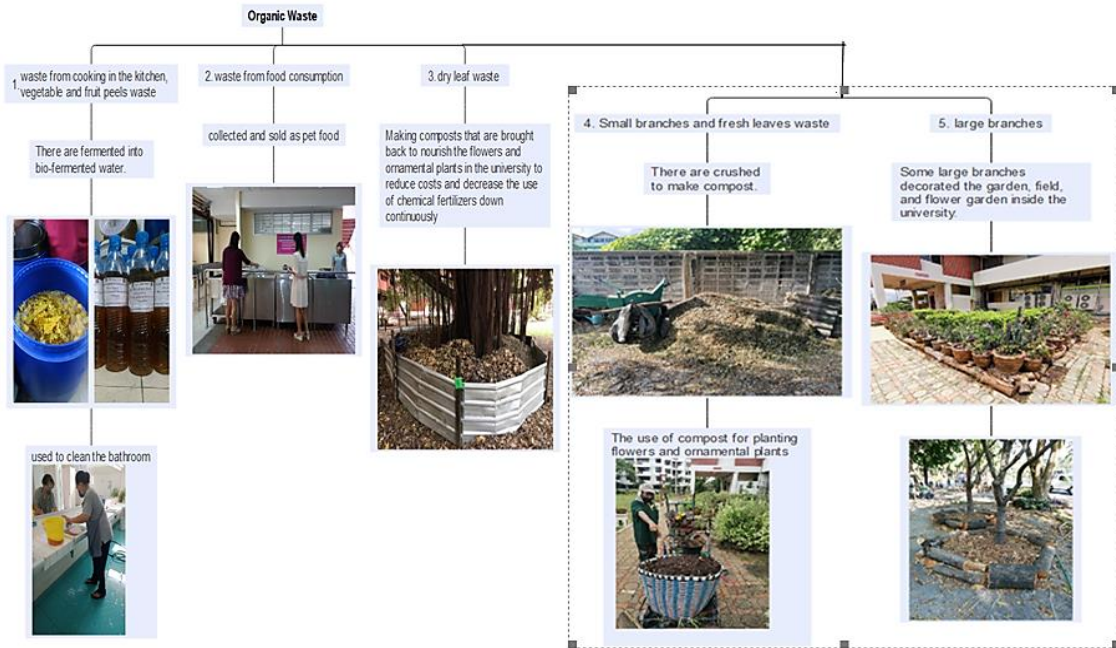


Figure 21 Organic waste treatment/reuse

Inorganic waste

All Inorganic waste was used for treatment/re-use as follows:

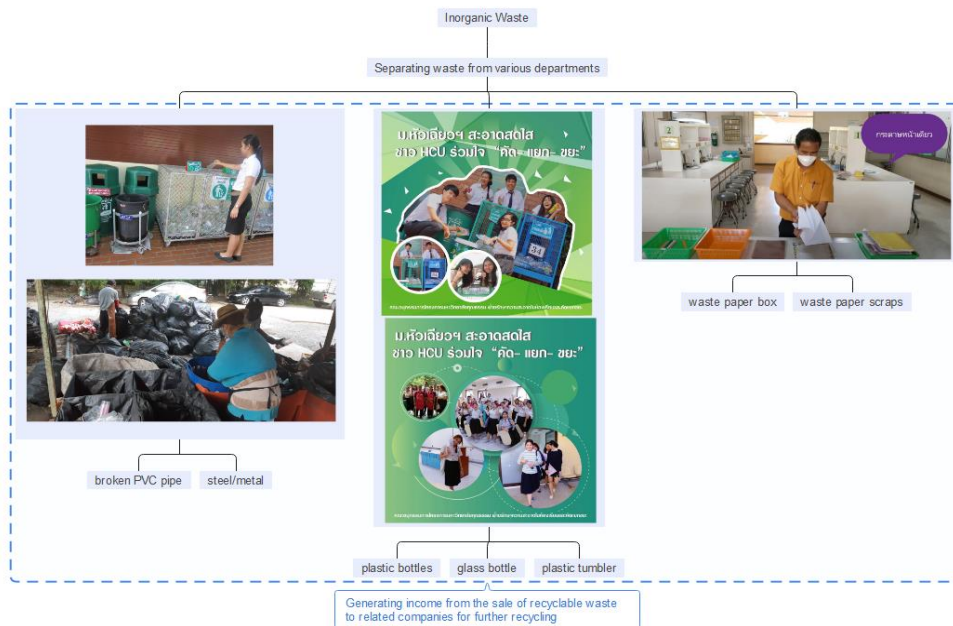


Figure 22 Inorganic waste was used for treatment/re-use

Electronic waste

All Electronic waste was used for treatment/re-use as follows:



Figure 23 Electronic waste was used for treatment/re-use



Organic Waste Treatment

Organic waste is mostly produced by the university staff and students’ activities that will generate a lot of waste and affects sustainable environment. Organic waste comes from 1) cooking in the kitchen, vegetable and fruit peels, and meat waste 2) food consumption, and food waste 3) dry leaves waste 4) fresh leaves waste 5) other waste such as large branches. Waste treatment policy can be created in a various way, as shown in the flowchart. The percentage of organic waste treatment in the university is around 90.62%, which was obtained by dividing the total amount of organic waste treated in kilograms (33,120) by the total amount of total organic waste in kilograms (36,550).

The total amount of total organic waste (kg)	36,550.00
The total amount of organic waste treated (kg)	33,120.00
The percentage of organic waste treatment (%)	90.62

Figure 24 The percentage of organic waste treatment

Inorganic Waste Treatment

The university has inorganic waste such as paper, plastic, glass bottles, iron/metal, UHT milk cartons. These are managed by defining the point of disposal, collecting, sorting, and selling to related companies for further recycling. However, garbage (solid wastes) that cannot be sold, such as plastic wrap for snacks, plastic bags contaminated with food waste. After being sorted, they will be gathered in black bags and sent to the Sub-district Administrative Organization for further storage and management. The percentage of Inorganic waste treatment per total Inorganic waste volume is 100.

Total volume of all inorganic waste (kg)	228,206
Total volume of treated inorganic waste (kg)	228,206
Percentage of organic waste treatment (%)	100

Figure 25 The percentage of inorganic waste treatment

Toxic Waste Treatment

Activities within the university that cause toxic waste are 1) used chemicals from teaching and first-hand learning activities 2) infectious waste generated by teaching and learning activities in the microbiology and medical technology labs and university clinics 3) electronic waste such as batteries, circuit, and electronic devices. The management processes are shown in the flowchart. The percentage of toxic waste treatment per total toxic waste volume is 100.

Total volume of all toxic waste (kg)	1,172.70
Total volume of treated toxic waste (kg)	1,172.70
Percentage of toxic waste treatment (%)	100.00

Figure 26 The percentage of toxic waste treatment

Sewage Disposal

Huachiew Chalermprakiet University's wastewater treatment system for Area 1 (HCU 1) consists of seven separately run underground treatment units installed underneath its seven buildings together with the anaerobic wastewater treatment system installed underneath 13 buildings within the area, while the sewerage system for Area 2 (HCU 2) is made into a centralized one in which the wastewater from a total of seven buildings flows underground into a shared treatment system.

These systems allow for recycling activities in which, most wastewater will be treated and reused, i.e., reuse of water in activities requiring lower water quality. The treated water is mainly used for watering plants. If there is any remaining water, it will be used to wash the road surface and use in the cooling system of the air conditioning system (after chlorination).

Moreover, our university submits monthly wastewater treatment report to Bang Chalong Subdistrict Administrative Organization, Samut Prakan Province. Sludge separation of both areas is pumped out every 3 months by an external contractor (Sa-Ard Dee Part., Ltd.) and is disposed by Song Khlong Subdistrict Administrative Organization, Chachoengsao Province at a sanitary landfill.



Figure 27 Documents of Sa-Ard Dee Co., Ltd.

(1. Sewage disposal license and 2. Agreement on the delivery for sewage sludge disposal to Song Khlong Subdistrict Administrative Organization, Chachoengsao Province)

2.4 Water

Water conservation program and implementation

The university provides tap water for most consumption on the premises. Anyway, in 2021, it initiated a plan to utilize some natural water resources which are the university’s ponds as an alternative to replace some tap water usage. The approaches of the water resource usage are as follows:

- Conduct a survey of natural water resources in the university.
- Carry out a plan to utilize the water resource as an alternative to replace some tap water usage.
- Prepare a long-term plan of the university’s water resource development for 2023-2027.

According to the survey, there are four clay ponds used for rainwater storage and retention, especially during the rainy season. Moreover, they promote the pleasant atmosphere and the balance of ecosystem in the university. The Table 1 shows the dimensions and the water capacity of each pond.



Table 6 Area and Water Volume of Each Pond in Huachiew Chalermprakiet University

No.	Pond	Space (m ²)	Depth (m)	Volume (m ³)
1	Health-Park Pond 1	1,390	2	2,780
2	Health-Park Pond 2	1,097	2	2,194
3	Pond behind Tang jew Building	2,974	1.5	4,461
4	66-Rai Pond	28,270	1.5	42,405
Total				51,840

In 2022, one water pump with capacity of 4,500 liters per hour was set up at Health-Park Pond 1. To replace some consumption of tap water, the pump had been run for one hour per day to water plants and trees near the pond, over the cool season (November – February). Totally, 360 cubic meters of water, which equals 0.69% of the total water volume of all the university’s ponds (51,840 cubic meters), had been pumped out during that period. More replacement of tap water consumption is expected by using water of other ponds in the future.

Regarding the university’s five-year (2023-2027) plan of water management, the water resource behind Tang jew Building is going to be developed with activities such as dredging the pond to increase water capacity, improving water quality with natural water treatment in accordance with the standard, improving scenery around the pond, and establishing a freshwater ecosystem learning center. Table 7 shows more details and timeline of the activities.

Table 7 Activities and Timeline of Development Plan for Natural Water Resource behind Tang jew Building

No.	Activities	2023	2024	2025	2026	2027
1	Dredging the pond to increase capacity for rainwater storage and retention.	↔				
2	Improving water Quality.		↔			
3	Developing area around the pond. For example, posting some notices about ecosystem knowledge.			↔		↔
4	Running treatment of water supply from a natural canal and using it in the university.					↔



Figure 28 Water reservoirs



Figure 29 Treated wastewater (effluent) faucet from wastewater treatment system (left) and use of treated recycled water to water plants (right)

The university recycles wastewater with the treatment system under the biological process called Activated Sludge. The processed water, then, is filled with chlorine to kill germs and disinfect other harmful contaminants. After that, the treated water is stored in the recycling pond, and it will be used for plant-watering in the university’s premises. It means that 100% of the treated water will be recycled.

Water-efficient appliances usage

Huachiew Chalermprakiet University has a total of 7,198 items of water- using equipment including sink taps, bidet sprayers, toilet bowls, faucets, urinals, and showers. At present 4,004 items out of the total are considered water-saving water equipment.

For examples, water-saving sink taps have a water consumption rate of not over 6 liters per minute. Water-saving toilet flush valves and urinal flush valves use not over 12 liters of water per time and not over 6 liters per minute, respectively. The flush valve system is a type



of plumbing system that does not require a tank behind the toilet bowl. Instead, it uses water pressure directly from the plumbing which saves more water than the tank system. The details are shown in Table 8. The overall ratio of water-saving equipment to water-using equipment is 55.63 %.

Table 8 Total number of water-using appliances, the number of water-efficient appliances, and the ratio of water-saving appliances to all water-using appliances.

Appliance	Total Number	Total number water Efficient appliances	Ratio (Percentage)
HCU1			
Sink Taps	773	773	100
Toilet Bowl	842	784	93.11
Faucet	842	0	0
Urinal	260	260	100
Set Hand Shower	239	0	0
HCU2			
Sink Taps	1044	1044	100
Toilet Bowl	1099	1099	100
Faucet	1099	0	0
Urinal	44	44	100
Set Hand Shower	956	0	0
HCU1+HCU2			
Sink Taps	1817	1817	100
Toilet Bowl	1941	1883	97.01
Faucet	1941	0	0
Urinal	304	304	100
Set Hand Shower	1195	0	0
Total Amount	7,198	4,004	
		Average Percentage	55.63

Besides, the water equipment has always been checked and maintained. The university has policies to fix any broken water equipment immediately, and if the equipment cannot be fixed, it will be replaced only with the new water-saving one. Also, the university holds a water-saving campaign such as posting a reminder “Turn off the tap when not in use”.

Consumption of treated water

Due to the fact that the university provides the student and staff with tap water for consumption, no treated water is not used for this matter.

Water pollution control in campus area

The university has policies and activities on water management within the university for sustainable use of water resources. by focusing on water management from the beginning water saving efficient use of water and reduce the contamination of the used water and the contamination of wastewater pollutants. There are measures to manage and control the contamination of water pollutants as follows:

Measurement to manage and control contamination of water pollutants at the source

1. Water saving policy

- 1.1. Campaigning and raising awareness among people to use water economically and efficiency
- 1.2. Purchase water-saving equipment to replace old equipment according to the list of green products issued by government agencies.
- 1.3. Check and report leakage/leakage of piping system (including sanitary ware).
- 1.4. The equipment and plumbing systems must be repaired immediately when water leaks.
- 1.5. Do not leave the water open when cleaning containers.
- 1.6. Close the faucet when not in use.
- 1.7. Use a liquid container and hand cleaner because it uses less water than soap.

2. Water reserve policy and the use of water from natural water sources

- 2.1 The treated wastewater and water from the drainage system which are used for watering trees.

3. Measurement to improve water quality for consumption

- 3.1 There is a water filter installed to adjust the quality of drinking water for employees and students to meet the standards by having a measurement at least every 6 months.

Measurement for reducing and treating wastewater within the university

1. Measurement to reduce wastewater from the source

- 1.1. Campaigning and raising awareness among people to use water economically and with maximum efficiency
- 1.2. Procurement of equipment that uses water economically to replace the equipment that uses the same water According to the announcement of the list of green products from government organizations
- 1.3. Do not pour chemicals into the drainpipe of the building from the laboratory. Pouring the use of chemicals into closed containers and collect and dispose together with the standardized hazardous waste disposal company.
- 1.4. Sweep and clean the food scraps which stuck on the container before cleaning.



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2. Wastewater recovery measurement

2.1 The treated wastewater is used for watering plants.

3. Wastewater treatment measures

3.1 Install oil separator in each workshop, clean the oil separator at least twice a month, and record or Take photos of waste volume and notify relevant personnel to record data.

3.2 There is a regular inspection of the operation of the wastewater treatment system, at least once a month

3.3 Wastewater quality is inspected at least once a quarter before releasing it to natural water sources.

2.5 Transportation

The total number of vehicles (cars and motorcycles) divided by total campus' population

Table 9 Number of vehicles in campus

No.	Vehicle	Total Number
1	Car managed by the university	15
2	Cars entering the university	598
3	Motorcycles entering the university	83
	Total	696

Note: $696 / 7518$ (population) = 0.093

Huachiew Chalermprakiet University has vehicles that are used on university missions. Between August 2021 - July 2022, there were 15 vehicles, which can be divided as follows:

1. Passenger van, diesel engine, 5 vans
2. Two-row minibus, diesel engine, 1 minibus
3. Pickup truck, diesel engine, 2 trucks
4. Personal sedan gasoline engines 2 cars
5. Office car gasoline engines 5 cars

The university provides in-out cards and parking systems in the campus area for students and staff using a car as a means of travel. Between August 2021 and July 2022, the great number of vehicles whose owners are students and staff who requested an entrance-exit cards and used parking in the university were 598 cars. The vehicles were comprised of 79 cars for students and 519 cars for HCU Staff. During the period of the regular semester, a great deal of students, HCU staff and visitors entered the campus and parked their vehicles in 7 parking lots, namely:



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1. Parking lot behind the administration building,	146 cars
2. Parking lot along the wall opposite the football field 2,	26 cars
3. 2-acer car park,	200 cars
4. Parking lot under the 5-storey operating building,	26 cars
5. Parking lot beside the auditorium,	52 cars
6. Maze Garden Parking lot,	36 cars
7. Parking building on HCU campus 2,	114 cars
Total	600 cars

Huachiew Chalermprakiet University provides in-out cards and parking systems in the university area for students and HCU staff who use motorcycles as a means of transportation. In the academic year 2021 (1 August 2021 – 31 July 2022), the number of the authorized vehicles for parking on campus was 17 vehicles which consisted of 15 moto-bikes for students, 2 moto-bikes for HCU staff, including 66 former authorized ones. That makes a total of 83 vehicles. During the regular semester, the students and staff who has motorcycles used the parking service at the university. The number of motorbikes was limited according to the number of parking stickers. The university has a policy for motorcycles to park in the provided area. Riding a motorcycle inside the university is forbidden. This includes receiving - delivering goods and parcels which must be done in front of the entrance door.

The university has provided the students and staff with white bicycles and an electric vehicle (free of charge) that can be used as a means of travelling within the university.

Between August 2021 and July 2022, Huachiew Chalermprakiet University had 6,781 students, 737 academic and support staff. The total number of university population was 7,518 people. Calculation, the total number of vehicles (598 cars and 83 motorcycles with combustion engines) per the total number of the university population using the following calculations:

$$\frac{(5.1-1) + (5.1-2) + (5.1-3)}{(5.1-4)} = \frac{696}{7,518} = 0.093$$

Shuttle Services

1. The number of shuttle buses serving in the university

The campus shuttles are buses, multipurpose vehicles (MPVs) and minivans. The university has a shuttle service for the students and staff commuting from Bang Phli campus (HCU 1) to the extension area (HCU2) by providing 10 private air-conditioned vans on weekdays between 6:00 a.m.- 6:00 p.m. The fare is 6 baht/person/ trip. (University contributes a part of the cost)

2. The average number of passengers of each shuttle bus in one trip which can be assessed from the seats of the vehicles.

Between August 2021 and July 2022, the students who live in HCU 1 dormitories were 1,509 and 2,207 students in HCU 2 dorms, totaling 3,716 students. The number of students using the service per day was about 20 % (742 students).

3. The total number of transfers per day

Huachiew Chalermprakiet University has a shuttle service for students and staff who commuted from Bang Phli Campus (HCU 1) to the extension area (HCU 2) by providing 10 private air-conditioned passenger vans on weekdays between 7:00 a.m.- 5:00 p.m. The fare is 6 baht/ person/ trip (departs every 15 minutes in 1 day, or about 10 hours a day). Therefore, the van service from HCU 1 to HCU2 is 40 trips a day, and the service from HCU 2 to HCU 1 is 40 trips. That makes 80 trips a day. It means a van can run 8 trips a day, so the total number is approximately 960 passengers per day (80 trips, 12 people each, total 960 passengers).



private air-conditioned vans (shuttle buses serving in the university)

Figure 30 HCU Shuttle service

Zero Emission Vehicles (ZEV) Policy on Campus

1) Zero Emission Vehicles (ZEV) policy in university, the number of Zero Emission Vehicles (ZEVs) inside university per day stating the average daily number of zero-emission vehicles (e.g., white bikes, canoes, snowboards, electric cars, etc.), including both university and personal vehicles.

Huachiew Chalermprakiet University has two 13-seat electric cars with free of service charge for students and HCU staff on weekdays and white bicycles for students, HCU staff and general outsiders who use the campus area as a route for commuting to work between Gate 4 and Gate 3 (bus stop). At present, the university has 366 white bicycles for service. In the academic year 2021, the university purchased an additional 100 bicycles. That made the total number of 466 bicycles.

2) The total number of Zero Emission Vehicles (ZEVs) per university population

The number of zero emission vehicles (ZEVs) on campus per day by specifying the average number of zero emission vehicles including both university and personal vehicles.

Huachiew Chalermprakiet University has a lot of zero emission vehicles (ZEVs) which are. Separated into two 13-seat electric cars and 466 white bicycles for servicing per day.

Total number of the university population

Between August 2021 and July 2022, Huachiew Chalermprakiet University had 6,781 students and 737 academic and support staff. The grand total number of university population was 7,518.

Calculation:

$$\frac{\text{The Number of Zero Emission Vehicles (ZEV)}}{\text{Total population}} = \frac{468}{7,518} = 0.062$$



13-seat electric cars with free of service charge for students



white bicycles for servicing per day with free of service charge

Figure 31 HCU Zero emission vehicles

Ratio of Parking Area to Total Campus Area

Huachiew Chalermprakiet University has parking areas for 1,271 cars, divided into two sites. The first car park is on campus 1 (HCU 1) for 828 cars. The second one is on campus 2 (HCU 2) for 443 cars. On average, a car takes 14.3 square meters (2.6 meters wide X 5.5 meters long) for parking. Thus, the university has a total parking area of 18,175.30 square meters for cars (1,271 cars X 14.3 square meters area per 1 car) and 427-square meters parking lot for motorcycles (14 meters wide x 30.50 meters long). The total number of parking area is 18,602.30 square meters.

Total main campus area: 400,114 m²

Total parking area = 18,602 m²

Ratio = 18,602/400,114 = 0.046

Program to limit or decrease the parking area on campus for the last 3 years (from 2018 to 2020)

The current campus transportation project aims to limit or reduce the parking space on campus from 2018 to 2021.

1. Huachiew Chalermprakiet University provides transportation service such as van for students and staff from the campus 1 to campus 2 to facilitate students and staff and to reduce the use of private cars and the parking space as well as to limit the number of cars. (Fare rate 6 baht/person/trip).

2. The university also has a campaign for staff and students to live in the same dormitory or live. In the same housing estate, they travel to work at the university by sharing one car (Carpool Project). To reduce the number of private vehicles.

3. The university also has white bicycles for students, HCU staff and general outsiders. At present, the university has 366 white bicycles for service. In the academic year 2021, the university purchased an additional 100 bicycles. That made the total number of 466 bicycles.

Number of Transportation Initiatives to Decrease Private Vehicles on Campus

Huachiew Chalermprakiet University charges for making a parking card. entrance-exit card. The student's university is 200 baht per academic year and 1,000 baht for overnight parking in the academic year. In 2020, there are 275 car parking cards for students. In the academic year 2021, there are 79 students parking cards (reduced by 196 cars). The university also has a campaign for staff and students to live in the same dormitory or live. In the same housing estate, they travel to work at the university by sharing one car. To reduce the number of private vehicles, for example, 5 personnel of the Office of Academic Development who live in Eua Athon Suvarnabhumi Village, Bang Chalong Subdistrict, Mueang District, Samut Prakan Province have shared the same car to travel to work at the university, etc. The university has provided the students and staff with white bicycles and an electric vehicle (free of charge) that can be used as a means of travelling within the university. The university has a shuttle

service for the students and staff commuting from Bang Phli campus (HCU 1) to the extension area (HCU 2) by providing 10 private air-conditioned vans on weekdays between 6:00 a.m.- 6:00 p.m. The fare is 6 baht/ person/ trip.



Carpool project for reduce the using of private car

Figure 32 Carpool

Pedestrian Path Policy on Campus

Huachiew Chalermprakiet University provides good walkways designed for safety and convenience. Easy access for disabled people is also provided in some areas.

1. Separator between for general vehicle parking and pedestrian vehicle parking
2. Ramps which have suitable design for pedestrian having physical disabilities.



Figure 33 Signage and ramps for the disabled

2.6 Education and Research

Sustainability courses/subjects

In the past, subjects in the different curricular offerings taught in the university have included key issues or topics related to sustainability embedded on them as deemed useful by the curricular managers. From academic year 2021 onwards, the university has included in its long-term strategic policy to prioritize the inclusion of sustainability in academics. This resulted in the addition of more subjects incorporating the principles and practice of sustainability as defined by the UN's Sustainable Development Goals (SDGs). Table 1 shows the new subjects added for academic year 2021 while Table 2 are the already existing subjects, which were sent for last year's evaluation. The subjects were offered throughout the three semesters (first, second and summer) of academic year 2021.

The total number of courses/subjects with sustainability/green practices embedded for courses running in academic 2020-2021 was 14. For academic year 2021-2022, curricular offerings in the university have been revised to include sustainability principles and practices in the 72 subjects offered.

It is also meaningful and important to note that all GE (General Education) subjects are taught to all students who study in the university, which reflect the university's strong foundation and motivation towards providing the youth with ample knowledge, immersion, hands-on application on how to live and promote green, sustainable, and environmental-friendly practices. In other words, All incoming students (e.g., more than 2,100 incoming first year students in academic year 2021) must take these general education subjects related to green practices and sustainability.

$$\begin{aligned} \text{The ratio of sustainability courses to total courses/subjects} &= 72/1354 \times 100\% \\ &= 5.32\% \end{aligned}$$

Sustainability research fund

The sustainability research fund of the university comes from two main sources: (1) University or HCU Fund and (2) Outside sources. The total sustainability research fund for academic 2019 to 2021 will be shown in turn below together with the research topics in each Faculty of the university. The university research can be summarized in the table below.

Table 10 Average sustainability research fund in three years

Year	Amount (in USD)
2019	267,273
2020	306,648
2021	48,206
TOTAL	622,127
Average research fund dedicated to sustainability	207,376.67

Huachiew Chalmprakiet University's average annual research fund dedicated to sustainability for the last 3 years is equivalent to **207,376.67 US Dollars**.

Calculation:

$$\frac{\text{Average research fund dedicated to sustainability}}{\text{Average Total Research Funds (in US Dollars)}} \times 100\% = 87.60\%$$

Number of scholarly publications on sustainability on environment and sustainability published annually over the last 3 years, using keywords: green, environment, sustainability, renewable energy, and climate change.

Table 11 Summary of scholarly publications

Keywords	2019-2021
Huachiew Chalmprakiet University + Green	51
Huachiew Chalmprakiet University + Environment	237
Huachiew Chalmprakiet University + Sustainability	166
Huachiew Chalmprakiet University + Renewable Energy	119
Huachiew Chalmprakiet University + Climate Change	206
Huachiew Chalmprakiet University + Carbon Footprint	21
Huachiew Chalmprakiet University + Green Agriculture	45
TOTAL	845

Average number of indexed publications (Google scholar) in a span of 3 years

The number of scholarly publications that focused on sustainability markedly compared to the previous year. This is because in the past years, teachers in the university has no Google Scholar accounts yet and has not uploaded their scholarly publications on databases accessible by Google Scholar. Starting in the beginning of academic 2021, all teachers were required to published their scholar publications on Google Scholar, so they can be properly accounted. Thus, in the academic year 2021, there was a marked increase in scholarly publications related to sustainability.

From the Google Scholar website search returns using the keywords Green, Environment, Sustainability, Climate Change, Carbon Footprint, and Green Agriculture, a total of **845 scholarly publications** were found from academic year 2019 to 2021. These total number does not include publications written in Thai language. This number is expected to increase in the future since the university has clearly stated in its short and long-term strategic plan that full attention should be given to addressing the sustainable development goals. The evidences below are actual screenshots coming the Google Scholar website.

Number of Events Related to Sustainability

After the university joined the UI GreenMetric last year, we have aimed towards attaining sustainability in most of the 17 UN Sustainable Development Goals (SDGs). In this section, we will provide evidence to show events, that are related to sustainability, we organized in the past three years (2019-2021). Most of these events are held every semester or three times a year or even more. For convenience in understanding the events, we divided them into two groups: (1) annual events related to sustainability, and (2) newly organized special events related to sustainability to address the long-term strategic plan of the university that started in academic year 2021. The events include conferences, seminar, workshops, awareness-raising, practical training, agreement-signing and others. Here is a link to one of the university's events on sustainability: [HCU AOMSIN - Google ไดรฟ์](#)

The table below shows the events related to sustainability that were hosted or facilitated by the university from academic year 2019 to 2021. From 2019 to 2021, there was an annual average of **55 events** related to sustainability that were hosted or facilitated by the university.



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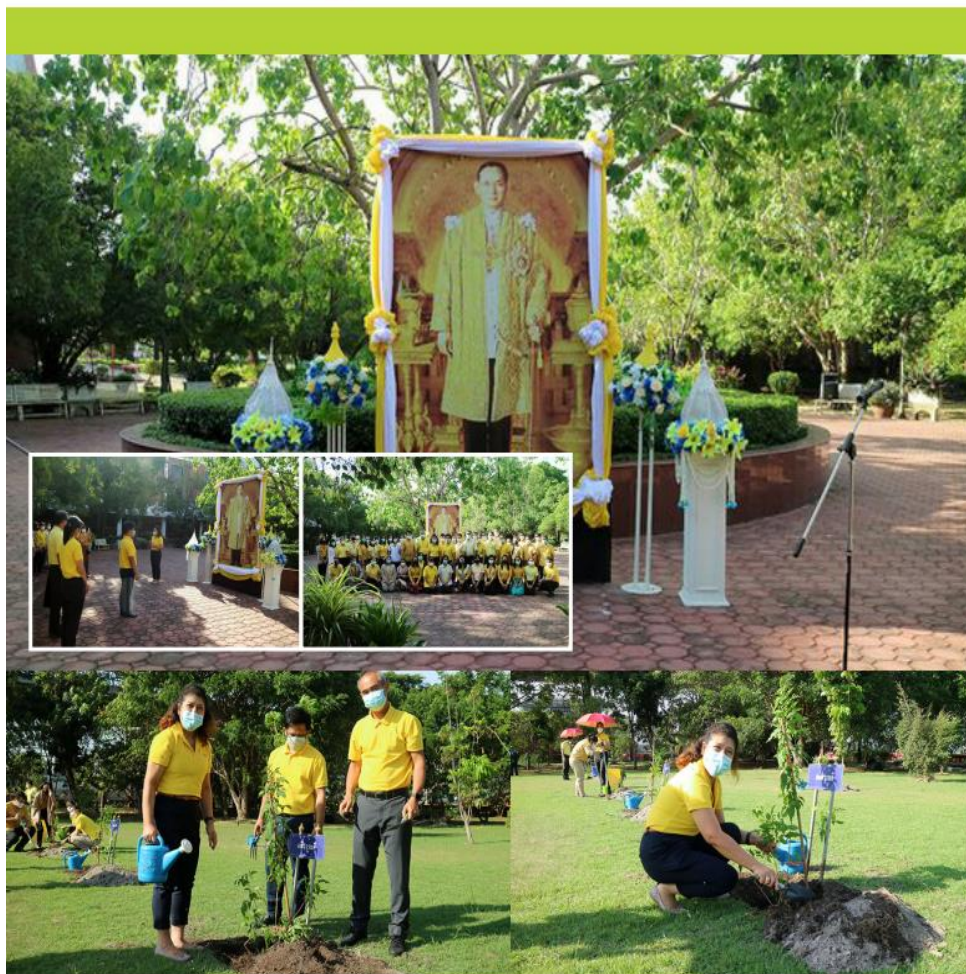


Figure 34 Examples of events related to sustainability

Number of student organizations related to sustainability

Student organizations in the university are varied. Sustainability activities are decentralized and conducted in each faculty. All of the groups below are individually managed by each of the **13 faculties**. From academic year 2019 to 2021, there were a total of **11 student clubs**. Images of these clubs are shown below.

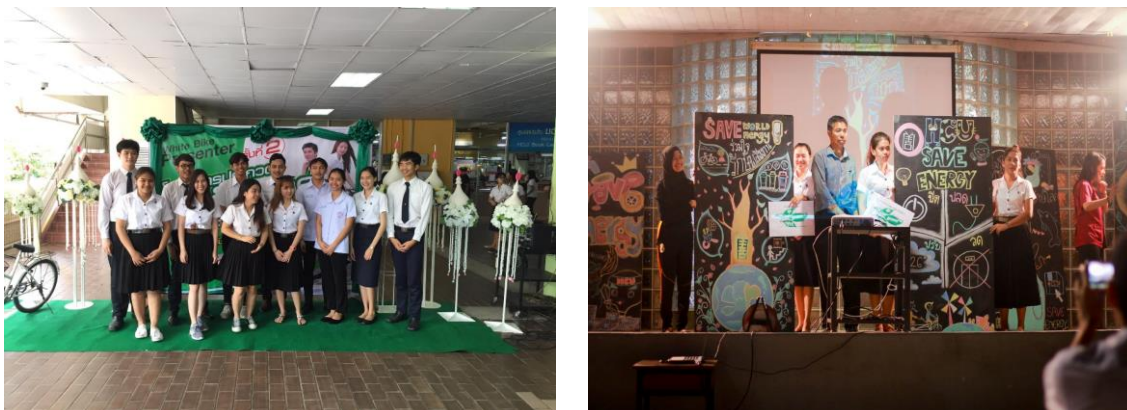


Figure 35 Sample of student organizations related to sustainability

Number of cultural activities on campus (e.g. Cultural Festival) including virtual activities (if any)

There are several Thai cultural activities that promotes not only the culture but also sustainability and they will be discussed briefly below with images as evidence. In 2021, the university hosted **six festivals related to sustainability** such Loy Krathong Festival, Songkran Festival, Chinese New Year Festival, Candle Offering Ceremony during the Buddhist Lent Day, Street Art Festival, and Teachers' Day (Wai Khru) Ceremony Celebration. Sample photos of these activities are shown below:



Figure 36 Number of cultural activities on campus related to sustainability

Number of university program(s) to improve teaching and learning

The advent of digital technology, digital disruption and digitalization have posed challenges to higher education. Moreover, there is a shift to blended/hybrid learning in Thailand due to the COVID-19 pandemic. This, to address these issues the university upgraded its facilities that includes the following: Microsoft Teams (MS Teams), Zoom, Virtual Reality (VR Oculus), WorldShare Management System (WMS) License from OCLC, HCU MOOC Lifelong Learning (LLL), HelpDesk for e-Learning and HCU MOOC LifeLong Learning, and Smart Classroom totalling to seven programs. Some programs the university acquired are shown below:

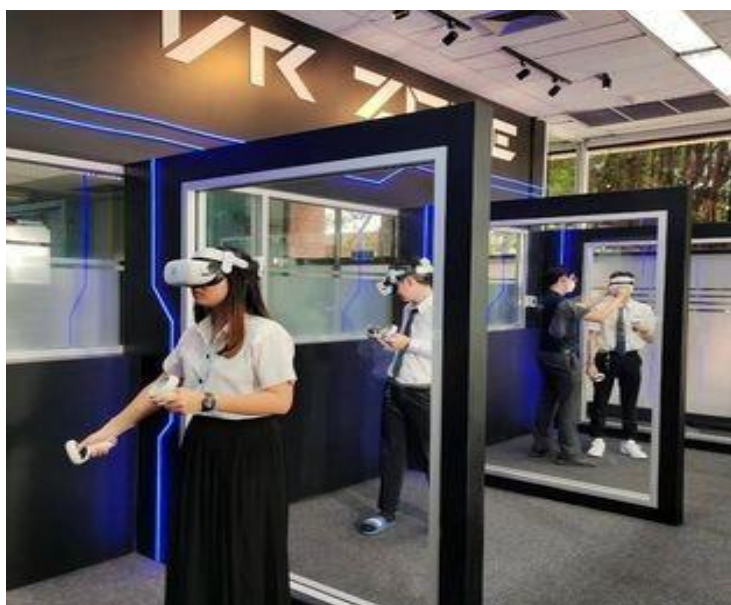


Figure 37 Sample university program(s) to improve teaching and learning

Number of sustainability community services projects organized and/or involving students

The university promotes sustainability activities in the local community. In 2021, the university has facilitated and hosted six community services projects organized involving both students and members of the faculty. These projects include Traditional Chinese Medicine Students Community Volunteers for Well-being and Sustainability (SDG3), Pharmacy Week Community Project, Community Tree-planting, Safety Awareness Week (Industry-based activity), Sustainable Living for the Elderly Project (Wreath-making), and Emergency Call Services.



Figure 38 Sample sustainability community services projects organized and/or involving students

Number of sustainability-related startups

In academic 2019, Huachiew Chalermprakiet University revised its curriculum to include Design Thinking and Startup subjects as part of the General Education curriculum. Consistent regular startup trainings and workshops were conducted (as shown in the photo above) since then to hone the students’ ability for design thinking, critical thinking, entrepreneurial mindset until they are able to come up with the startup project they would like to do. Then startup pitches trainings are conducted, so they can be highly competitive when presenting their pitches to companies and industries.

To address one of the long-term strategies of the university, which is to transform into a Sustainability University, three main requirements in initiating a start-up project at Huachiew Chalermprakiet University are set: (1) sustainable, (2) addresses the King Rama IX Sufficiency Economy Philosophy and (3) income-generating. Five successful start-ups emerged in 2021.



Figure 39 Sample of sustainability-related startups



เรียนรู้เพื่อรับใช้สังคม



Name of Company	: Huachiew Chalermprakiet University
Business Address	: 18/18 Debaratana Rd. (Km.18), Bang Plee, Samut Prakan 10540
Type of Building	: University
Building. Age of Building	: 29 years.
Nature of Business	: University.

