



Chulalongkorn University

# Sustainability Report 2018-2020



INNOVATIONS FOR SUSTAINABLE SOCIETY



# President's Statement



The year 2020 has been another challenging year for Chulalongkorn University. The COVID-19 pandemic has not only posed significant threats to the university, but has also provided us with new opportunities to rethink and adjust to an unprecedented state of vulnerability, or what we have come to call “the new normal”.

We have integrated digital and sustainable technology into our existing teaching, learning and organizational systems in order to increase the quality of our research, teaching and operations while maintaining social distancing as much as possible throughout the university campus.

Chulalongkorn University has been ranked one of the world's 100 top universities, according to the Best Global Universities 2020 ranking by U.S. News & World Report. In addition, the university has received the Prime Minister's Award 2020: Innovation for Crisis, with new innovations to combat COVID-19 by the National Innovation Agency.

The university remains strongly committed to deliver the highest academic standards and highest quality research, and also to provide innovations for society with more sustainable solutions for Thailand and the region. This is part of our ongoing effort to achieve the key United Nations (UN) Sustainable Development Goals (SDGs), which have been incorporated into our strategic policy since 2017.

In this year's Sustainability Report, we have highlighted many key SDG-related achievements and sustainability initiatives that have evolved since 2019 and into the COVID-19 pandemic period, in which Chulalongkorn University has played a major role in leading society in fighting the pandemic. This report reflects our university's strategic goals, visions, policies and commitment to become a more sustainable university.

A handwritten signature in white ink on a dark purple background. The signature is cursive and reads "B. Eau-arporn".

**Professor Bundhit Eau-arporn, Ph.D.**  
President of Chulalongkorn University



# Table of Contents

President's Statement	1
About Chulalongkorn University	5
Facilities @ Chula	6-7
Chulalongkorn University Organization Structure	8
Chulalongkorn University at a Glance	9
Initiatives and Results 2018-2020	11
<b>Principle 1: Sustainability Performance of Buildings on Campus</b>	<b>12-15</b>
<b>Principle 2: Campus-Wide Planning and Target Setting</b>	<b>16-19</b>
<b>Principle 3: Integration of Facilities, Research and Education</b>	<b>20-23</b>
Chulalongkorn University X Sustainable Development Goals	
 SDG 1 No Poverty	24-25
 SDG 2 Zero Hunger	26-27
 SDG 3 Good Health and Well-being	28-29
 SDG 4 Quality Education	30-31
 SDG 5 Gender Equality	32-33
 SDG 6 Clean Water and Sanitation	34-35
 SDG 7 Affordable and Clean Energy	36-37
 SDG 8 Decent Work and Economic Growth	38-39
 SDG 9 Industry, Innovation and Infrastructure	40-41
 SDG 10 Reduced Inequalities	42-43
 SDG 11 Sustainable Cities and Communities	44-45
 SDG 12 Responsible Consumption and Production	46-47
 SDG 13 Climate Action	48-49
 SDG 14 Life below Water	50-51
 SDG 15 Life on Land	52-53
 SDG 16 Peace, Justice and Strong Institutions	54-55
 SDG 17 Partnerships for the Goals	56-57



# About Chulalongkorn University

Chulalongkorn University is the first institution for higher learning established in Thailand. Founded by King Vajiravudh (King Rama VI) in March 1917, the university was named after his father, King Chulalongkorn (King Rama V).

Chulalongkorn University has played a leading role in national and international development throughout the past 103 years. Our graduates have served the people by applying their knowledge and expertise for the advancement and prosperity of society and contributing toward the development of the nation in all areas.

Located in the central district of Bangkok, the capital of Thailand, the Chulalongkorn University campus covers a tract of land covering approximately two million square meters (494 acres), of which about 50% is dedicated solely to academic activities. Currently, Chulalongkorn University offers more than 450 academic programs, of which approximately 20% are international programs that use English as the medium of instruction. In the academic year 2019, there were 37,018 regular students enrolled, and the university employed 8,229 academic members and support staff.

In the 2019 academic year, from the total university budget of 20.77 billion Thai baht (US\$682.62 million), the university allocated approximately 2 billion baht (\$61.94 million) for research funds, of which approximately 40% was allocated to support sustainability-related research projects. Chulalongkorn University has secured the highest position in Thailand on the QS (Quacquarelli Symonds) Rankings since 2014. The university maintains its place in the top 50 universities in Asia and 247th in the world. According to the Times Higher Education University Impact Rankings 2020 (THE Impact 2020), of 766 participating universities from 85 countries, Chulalongkorn scored 76.9 out of 100 overall.

Chulalongkorn University is placed first in Thailand, ranked sixth in the Association of South East Asian Nations (ASEAN), and 45th in the world for its pursuit of sustainability under SDG 15: Life on Land, and in top 101-200 tier globally for overall sustainability performance. Lastly, according to the Universitas Indonesia (UI) GreenMetric World University ranking, Chulalongkorn University is ranked 84th in the world, with the highest score among Thai universities on Energy and Climate Change, Waste, and Education and Research criteria.

For the period from 2017-2020, in order to raise the University to an even higher level of excellence, Chulalongkorn University is progressively implementing four main strategies to fulfil its Vision and Mission as follows:

## **Vision**

To be a world-class national university, generating knowledge and innovation for the creative and sustainable transformation of Thai society.

## **Mission**

1. Create graduates who possess academic knowledge, advanced skills, a sense of public responsibility and leadership qualities.
2. Be a pioneer in the development of knowledge, creating innovations for teaching and research.
3. Produce internationally recognized academic research and output.
4. Apply knowledge learned toward the sustainable development of the country and society.

## **The Strategies**

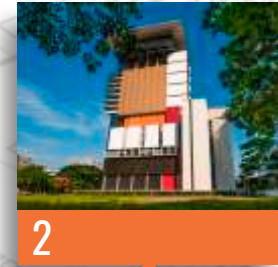
1. Human Capital
2. Knowledge and Innovation
3. Local Transformation
4. Global Benchmarking

For more information on Chulalongkorn University, please visit the University's website at [www.chula.ac.th/en/](http://www.chula.ac.th/en/)

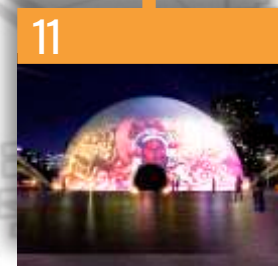
To learn more about Chulalongkorn University's various contributions to United Nations Sustainable Development Goals, please visit our Sustainability website at [www.sustainability.chula.ac.th](http://www.sustainability.chula.ac.th).

For more information on physical and environmental sustainability of the campus, please visit our Green Chula website at [www.green.chula.ac.th](http://www.green.chula.ac.th).

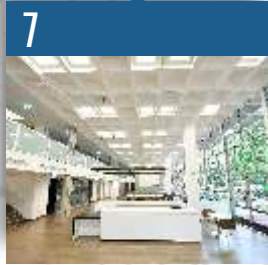
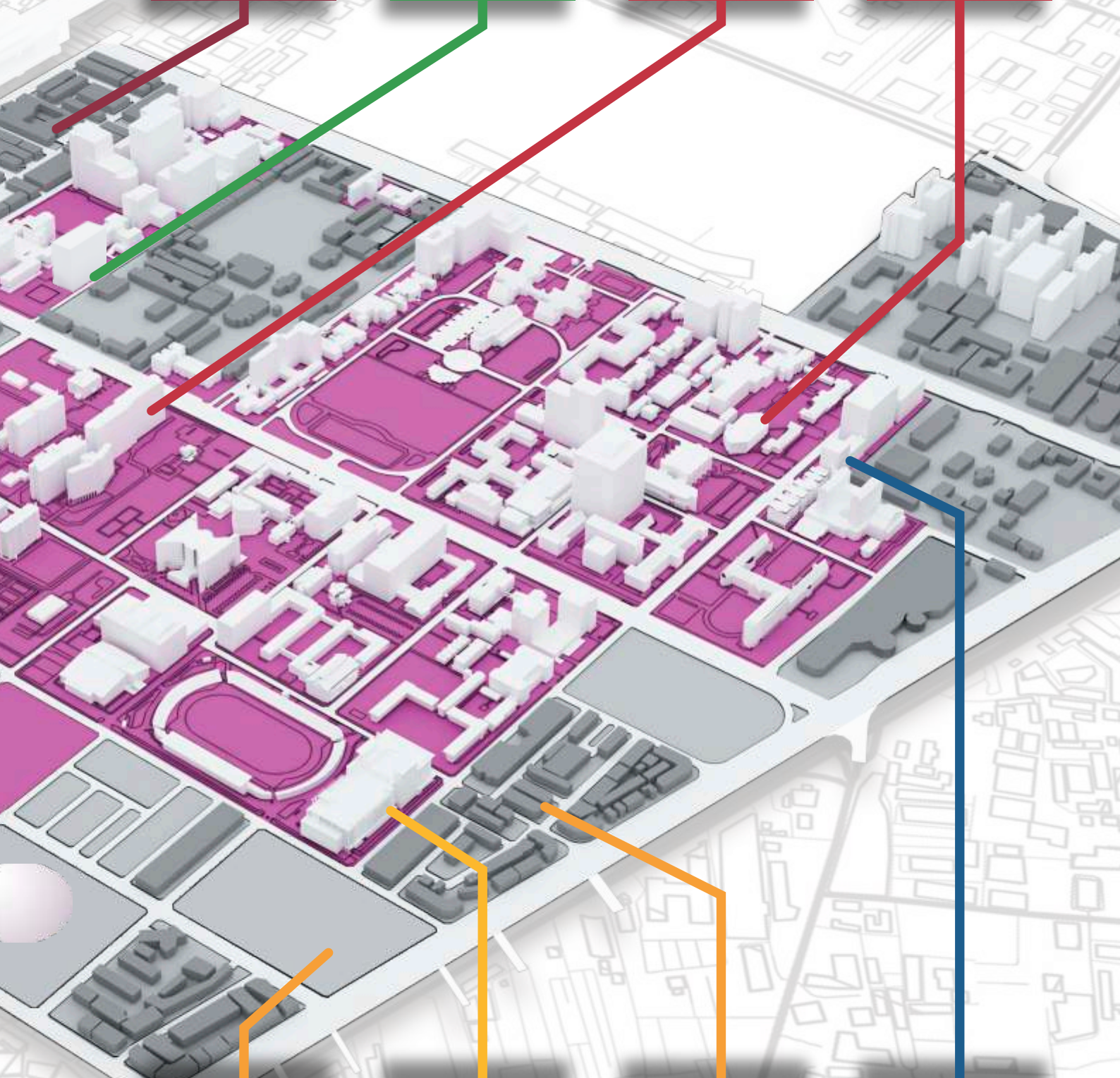
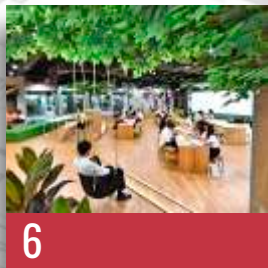
# Facilities @ Chula



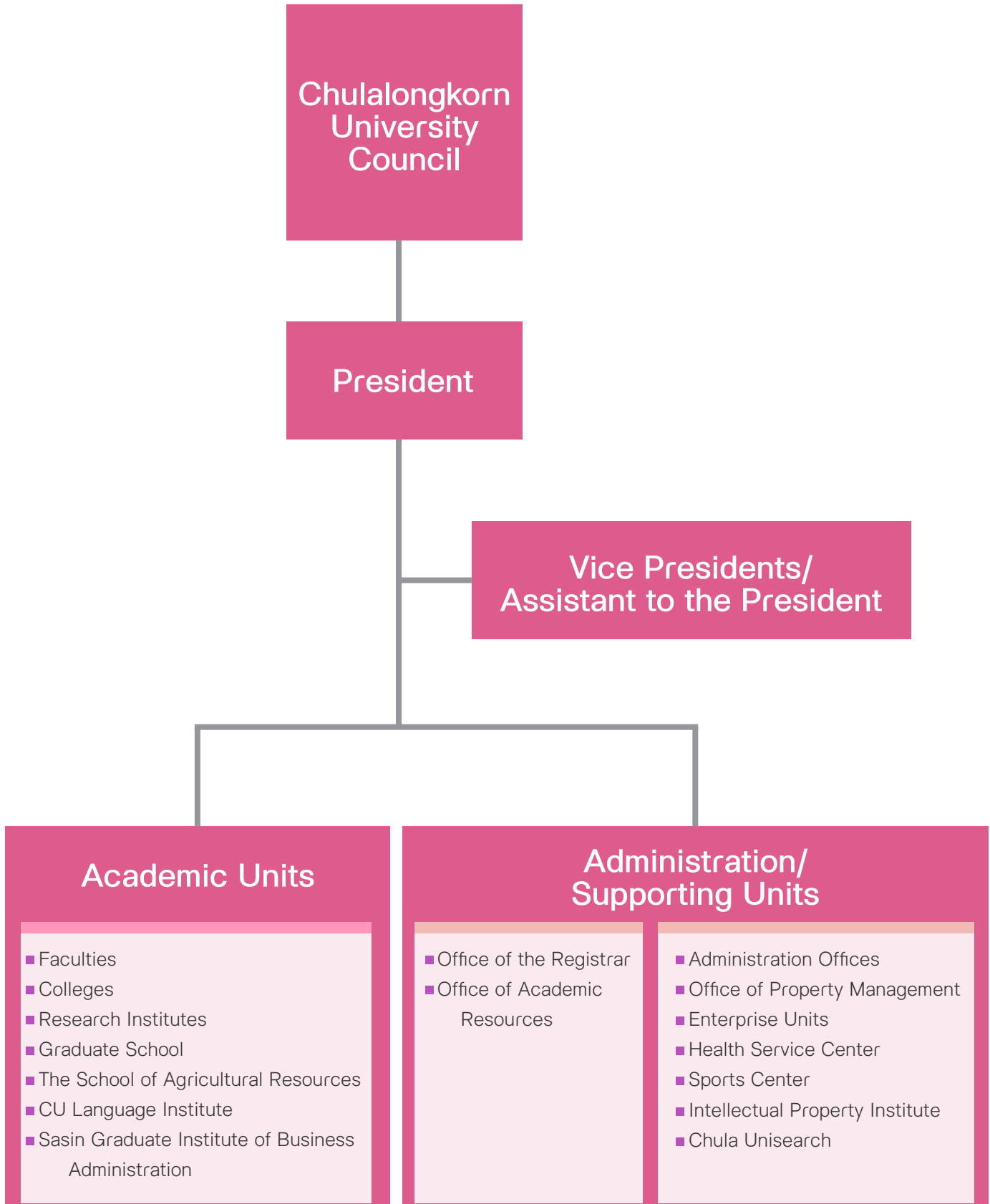
1. CU Hangout Space
2. CU Innovation Hub
3. Siam Innovation District
4. New Research Building
5. Student Dormitory
6. Plearn Space
7. Social Innovation Hub
8. Chula Art Town
9. Solar Rooftop
10. Creative & Startup Village (Block28)
11. FAAMAI Digital Arts Hub
12. CU Centenary Park



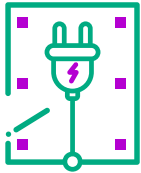




# Chulalongkorn University Organization Structure

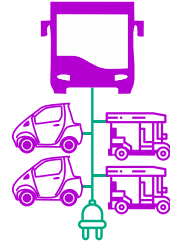


# Chulalongkorn University At a Glance: FY2019



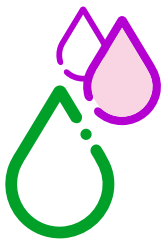
Energy Use per  
total floor area

**69.2** kWh/m<sup>2</sup>/yr



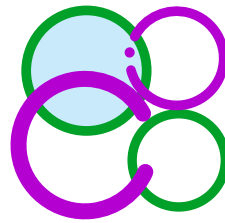
Number of passengers  
taking sustainable  
transportation

~**5** million  
passengers



Water Usage

**1.32** million  
m<sup>3</sup>/yr



**4** new  
co-learning spaces  
across campus space  
for stimulating knowledge,  
and fueling creativity  
and imagination



Total Waste

**2,228** tonnes/yr



Percentage of  
campus green space  
~**50%** with over 250  
trees species



Recycled  
Food Waste

**670** tonnes/yr



Courses related to  
sustainability

**>1,300** courses



Number of Plastic Cup  
reduction last year

**>2** million  
cups



Sustainability events

**>120** events



Carbon Footprint

**1.22** tCO<sub>2</sub>eq/  
capita/yr



Sustainability efforts  
budget and research funds

**72** million  
USD



# Initiatives and Results 2018-2020

“Sustainability” is one of the four pillars of the mission that Chulalongkorn University has pledged to carry out from 2017 to 2020. As Chulalongkorn has established its place as one of the world’s leading universities, we aspire to be a university of academic excellence and ultimately recognize our responsibility to promote social, economic and environmental sustainability.

In 2017, the president of the university, Prof Bundhit Eua-arporn, Ph.D. set up the CU Committee for Campus Sustainability to oversee all sustainability programs on campus. In the same year, Chulalongkorn University announced its first Sustainable University Policy which is based on the Sufficiency Economy philosophy developed by the late King Bhumibol Adulyadej (King Rama IX) and the United Nations Sustainable Development Goals (SDGs). The policy drives sustainability practices in five different areas: 1) Infrastructure and Physical Features, 2) Development for Staff Living, 3) Resource and Environmental Management, 4) Teaching and Research, and 5) Administration and Social Engagement.

Since then, the Sustainable University Policy has paved the way and opened many options for the integration of sustainability practices with university education and operations. As Chulalongkorn is a comprehensive university, a diverse range of initiatives have been executed by various units across campus. To better understand our sustainable progress, strategies, initiatives and performance, we are proud to present our fourth Sustainability Report.

The report is divided into two parts. The first part was prepared in accordance with our prior reports — FY2014, FY2017 and FY2018, based on the ISCN-GULF Sustainable Campus Charter. The content is guided by integration of reporting principles and methods of the Global Reporting Initiative (GRI) Standards, International Organization for Standardization (ISO), Association for the Advancement of Sustainability in Higher Education (AASHE) and the Universitas Indonesia (UI) GreenMetric.

Performance data were categorized into three areas: 1) Buildings and Their Sustainability Impacts, 2) Campus-Wide Planning and Target Setting, and 3) Integration of Research, Teaching, Facilities and Outreach. The ISCN-GULF Sustainable Campus Charter framework provides a suitable matrix for our stakeholders to understand the development and continuity in various area of campus development.

This is the fourth sustainability report to be published by the university, providing performance data in the first part for the reporting period of the fiscal year 2019 (October 2018 to September 2019) or the academic year 2018 (August 2018 to July 2019). The reporting covers all units of Chulalongkorn University, except the Chulalongkorn University Demonstration Primary School, Chulalongkorn University Demonstration Secondary School, and the King Chulalongkorn Memorial Hospital.

As the university has fully applied the Sustainable Development Goals set by the United Nations to drive sustainable practices, we realize that the role of the university extends beyond the traditional role in research and teaching. In the second part of this report, content is organized under the headings of the 17 SDGs, in which some of the many activities and initiatives that contribute to the achievement of the goals are summarized. While we cannot capture the full list of initiatives from across the campus, we have tried our best to highlight case studies through consultation with related stakeholders.

Due to the COVID-19 pandemic, the university operation was greatly affected by the crisis. Although the university was shut down from March to July 2020, many innovations were generated during that time with great impact on society. As a result, we have endeavored to include a few case studies to exemplify our commitment to sustainability, social, economic and environmental stewardship. Therefore, in the second part of this report, the case study content covers projects and initiatives from October 2018 to September 2020.

# Principle 1: Sustainability Performance of Buildings on Campus

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
<b>1. Resource use</b>			
1.1 Electricity use	75.24 kWh/m <sup>2</sup> /yr	67.04 kWh/m <sup>2</sup> /yr	69.21 kWh/m <sup>2</sup> /yr (+3.24%)
1.2 Water use	1,503,576 m <sup>3</sup> /yr	1,329,570 m <sup>3</sup> /yr	1,322,232 m <sup>3</sup> /yr (-0.55%)
1.3 Electricity and water costs and saving achieved	Total electricity cost \$13,631,872 (408,956,176 THB) Total water cost \$901,619 (27,048,579 THB)	Total electricity cost \$14,462,877 (433,886,314 THB) Total water cost \$802,086 (24,062,585 THB)	Total electricity cost \$14,845,963 (451,391,508 THB) (+4.03%) Total water cost \$785,517 (23,883,653 THB) (-0.74%)
<b>2. Waste, recycling, local emissions, and non-compliance</b>			
2.1 Waste and recycling	Total waste: 2,107.75 tonnes/yr Total recycled waste: 412.53 tonnes/yr Percentage of recycled waste: 19.57%  Approximate distribution by waste type: Plastic 36%, paper 31%, food waste 19%, glass 4%, hazardous waste 3%, metal 2%, fabric 2%, wood 1%, others 2%	Total waste: 1,915.82 tonnes/yr Total recycled waste: 219.73 tonnes/yr Percentage of recycled waste: 11.47%  Approximate distribution by waste type: Plastic 26.6%, paper 25%, food waste 35.2%, glass 4.3%, hazardous waste 0.02%, metal 0.4%, fabric 1.4%, wood 0.6%, rubber 0.5%, others 5.2%	Total waste: 2,228.10 tonnes/yr Total recycled waste: 142.99 tonnes/yr Percentage of recycled waste: 6.41%  Approximate distribution by waste type: Plastic 25%, paper 25%, food waste 30%, glass 7%, hazardous waste 1%, metal 3%, wood 1%, others 8%
2.2 Waste disposal cost and saving achieved	Cost of hazardous waste disposal (by incineration): \$17,833/yr/25t (535,000 THB/yr/25t)	Cost of hazardous waste disposal (by incineration): \$17,833/yr/25t (535,000 THB/yr/25t)  Waste disposal by incineration: \$1,050 (31,500 THB)  Waste disposal by local municipality: \$17,387 (521,600 THB)	Cost of waste disposal by local municipality: \$17,582 (534,600 THB)  Chemical waste disposal: \$64,898 (1,973,210 THB/yr)

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
2.3 Incidents of non-compliance with environmental regulations	No data	Non-compliance incidents: none  Low-risk accidents: 12 Medium-risk accidents: 4 High-risk accidents: none	Non-compliance incidents: none  Low-risk accidents: 21 Medium-risk accidents: 10 High-risk accidents: none
<b>3. Research/IT facilities and sustainability</b>			
3.1 Research/IT facilities and sustainability	Average energy consumption for research facilities: 133.86 kWh/m <sup>2</sup> /yr (Median 89.63 kWh/m <sup>2</sup> /yr)		Average energy consumption for IT facilities: 12,540.06 kWh/m <sup>2</sup> /yr (Median 14,526.72 kWh/m <sup>2</sup> /yr)  * First documented consumption for IT facilities
3.2 Chemicals consumed	Amount (by phase of chemical matter):  Solid 2,657.62 kg Liquid 14,637.51 liters Gas 290.10 m <sup>3</sup>		Amount (by phase of chemical matter):  Solid 4,187.68 kg Liquid 18,503.70 liters Gas 503.00 m <sup>3</sup>
3.3 Hazardous waste from research/IT facilities	Total chemical waste:  Solid 12,228.97 kg Liquid: 45,473.24 liters	Total chemical waste:  Solid: 11,464.05 kg Liquid: 45,057.25 liters	Total chemical waste:  Solid: 10,115.37 kg (-11.76%) Liquid: 49,680.61 liters (+10.26%)
<b>4. Users</b>			
4.1 Handicapped access		Number of renovation projects focusing on handicapped ease of use: 5  Budget spent: \$266,264 (7,987,921 THB)	The university incorporated the universal design principle in new building and renovation projects. Handicapped access and restrooms-for-all were provided to university facilities.

# Principle 1: Sustainability Performance of Buildings on Campus

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
4.2 Indoor air quality	<p>The university upgraded a few on-campus canteens with improved exhaust ventilation systems. High-performance air-conditioning systems were installed to maintain a comfortable thermal environment. In new building and renovation projects, a separate space with good ventilation is provided for copy rooms.</p>	<p>Budget allocated for indoor environmental quality assessment tools: \$33,327 (999,830 THB)</p>	<p>In response to the PM2.5 crisis in January 2020, the university put more emphasis on indoor and outdoor air quality monitoring. Multiple real-time air quality stations were set up across campus. Plans have been made to increase the number of stations and develop data analytics tools in 2021.</p>
4.3 Campus community participation in planning (integrated design)	<p>The Office of Physical Resources Management, in charge of design and construction affairs, promoted the participatory design process for newer projects. The process involved a survey of users' needs and preferences with a goal to develop design proposals that best meet the requirements of the campus community.</p>	<p>The CU 2nd Century Master Plan utilizes the foresight method, which promotes campus community participation in developing the new campus master plan.</p>	<p>The university has tried to increase the number of projects that incorporate campus community participation in design and planning. A few facilities and ground renovation projects incorporated participatory design to meet the requirements of campus community members, especially students.</p>
<b>5. Building design aspects</b>			
5.1 Sustainable building standards applied and explored	<p>Architects and engineers have been encouraged to integrate green principles into the designs of new building and renovation projects on the campus. Buildings are regulated by the Energy Conservation Promotion Act of 1992 as well as other rules and regulations.</p>	<p>Installation of a prototype Building Energy Management System (CU-BEMS), a smart building control system, to control and monitor energy consumption in the workplace.</p>	<p>A plan for a campus-wide CU-BEMS and solar rooftop installation is being developed by the Property Management Office, the Office of Physical Resource Management, the Energy Research Institute and the Department of Electrical Engineering. The project is expected to be launched in 2021.</p>



Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
	<p>In 2017, the university's commitment to sustainability was reflected in the advancement of the Campus Sustainability policy and action plan to implementation-strategies. The university also appointed a committee on energy conservation to oversee energy consumption systems with the goal of achieving the highest efficiency through an energy management program.</p> <p>In 2016-2017, a few units across campus explored the use of smart building control systems to control and monitor energy consumption in the workplace.</p>		<p>In 2020, The university was in the process of adopting sustainable building design standards such as Thai Rating of Energy and Environmental Sustainability (TREES) or the US-based LEED (Leadership in Energy and Environmental Design) system as the design standard for new and existing building projects.</p>
5.2 Long-term use and flexibility	To promote long-term use and flexibility, in new building and renovation projects, architects and engineers are encouraged to use construction materials that are durable with low toxicity.	An outdated lecture hall was renovated and turned into a co-learning space called CU Plearn Space (Plearn = Play + Learn)	Two additional co-working/ learning spaces were opened at the beginning of the first semester of AY2020 including the 1,300 m <sup>2</sup> CU Social Innovation Hub and the 900 m <sup>2</sup> CU Hangout Space. Both are renovation projects in which refurbished abandoned library space and classrooms were repurposed as co-working/learning spaces that support current students' learning lifestyle.
5.3 Integration of landscape and building design	Total area on campus covered in forest and planted vegetation: 54.5%	Number of projects focusing on landscape design: 7	Total area on campus covered with forest, planted vegetation, and area for water absorption: >50%

## Principle 2: Campus-wide master planning and target setting

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
<b>1. Institution-wide carbon targets</b>			
1.1 Carbon emissions	Total greenhouse gas (GHG) emissions: 64,785.6 tonnes of carbon dioxide equivalent (tCO <sub>2</sub> eq)  Per capita: 1.44 tCO <sub>2</sub> eq Transport: 522.3 tCO <sub>2</sub> eq	Total GHG emissions: 52,364.83 tCO <sub>2</sub> eq  Per capita: 1.48 tCO <sub>2</sub> eq Transport: 1,154.65 tCO <sub>2</sub> eq	Total GHG emissions: 55,037.07 tCO <sub>2</sub> eq  Per capita: 1.22 tCO <sub>2</sub> eq Transport: 1,267.24 tCO <sub>2</sub> eq
<b>2. Master plan</b>			
2.1 Coverage of campus area (%) per master planning initiative		~95%	
<b>3. Transport</b>			
3.1 Traffic frequency surveys	Number of cars entering the university daily: 9,097  Motorcycles entering the university daily: 4,717	Cars entering the university daily: 17,830  Motorcycles entering the university daily: 11,152	Cars entering the university daily: 16,566  Motorcycles entering the university daily: 12,446  The university has surveyed traffic frequency on an annual basis since 2016
3.2 Bicycle and pedestrian access	Average number of bicycles on campus daily: 1,290	Average number of bicycles on campus daily: 1,097  Length of covered pedestrian walkways: 3,220 meters	Average number of bicycles on campus daily: ~1,200
3.3 Estimated commuting distance or commuter energy use per person	No data	Average on-campus walking distance: 0.83 km/person/day	Average on-campus walking distance: 0.91 km/person/day
3.4 Urban mobility integration planning	Number of shuttles: 32  Average number of passengers per shuttle: 55  Total shuttle trips per day: 357	Number of shuttles: 36  Average number of passengers per shuttle: 50  Total shuttle trips per day: 426  Number of one-person EVs (Ha:mo): 32	Number of shuttles: 34  Average number of passengers per shuttle: 43  Total shuttle trips per day: 368  One-person EVs (Ha:mo): 30 E-tuk tuks: 15 E-scooters: 40

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
3.5 Campus fleet	Number of cars, buses & trucks: 176		Number of cars and buses: 139
<b>4. Food</b>			
4.1 Food safety	To enhance the safety and quality of food and beverage services provided in university canteens, the Food Safety Program was initiated in 2014 to carry out routine tasks from monitoring chemical additives in food to conducting training programs for vendors to surveying customer satisfaction. With collaboration between the Office of Physical Resources Management and the Faculty of Allied Health Sciences, the program was made mandatory for all canteen vendors. Each vendor's food safety practices will be evaluated every three months.		
<b>5. Social inclusion and protection</b>			
5.1 Diversity (faculty, staff and students)	1.International students: 556 2.International faculty members/researchers: 83	1.International students: 1,118 2.International faculty members/researchers: 91	1.International students: 803 2. International faculty members/researchers: 294
5.2 Access to education (in case of substantial fees)			Number of undergraduate scholarships: 7,176  Total value of undergraduate scholarships: \$7,783,263 (236,766,885 THB)  Graduate scholarships: 4,084  Total value of graduate scholarships: \$16,093,283 (489,557,695 THB)
5.3 Open access spaces for interaction and recreation			Sports and recreation: - Chulalongkorn University Sport Center  Co-working spaces: - Center for Academic Resources - CU Plearn (Play+Learn) Space - CU Hangout Space - CU Innovation Hub  Virtual platforms: -Chula MOOC: >270,000 applicants, 49 subjects  - Chula MOOC Achieve: 2 Courses

## Principle 2:

# Campus-wide master planning and target setting

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
5.4 Access to services and commerce	<p>Chula Student Wellness Center was established with the main goal to provide consulting services to staff and students.</p> <p>Number of consultation services provided: 2,029</p>	<p>Number of personal consultation services provided: 1,506</p>	<p>Personal consultation services provided: 2,835</p>
5.5 Participatory campus planning, integrating users and neighbors	<p>The committee on campus planning and environmental design was set up to envision new innovations in planning and environmental design on the campus and its surrounding areas. It encouraged participatory design processes in new projects as well as renovations.</p>	<p>The committee on campus planning and environmental design continued to explore novelty in campus planning and environmental design, and also promoted a participatory process in new projects and renovations. Meanwhile, the Office of Property Management of Chulalongkorn University (PMCU) took responsibility for the design and construction of projects in commercial zones (Siam Square, Sam Yan and Suan Luang).</p>	<p>Since 2019, the Office of Physical Resources Management and the Urban Design and Development Center (UddC) of the Faculty of Architecture have developed the CU 2040 Masterplan Project to provide a framework for physical development of the campus. Throughout the design process, all stakeholders — students, faculty, staff, alumni and the public — were invited to join with designers, researchers and developers in more than 60 brainstorming sessions. The discussions began with exploration and problem definition and continued through to the evaluation of the proposed master plan.</p>
5.6 Health and safety	<p>1.The CU Safety, Health and Environment (SHECU) Task Force was upgraded to a functional unit under the direct supervision of the president.</p> <p>2.The university allocated funds to upgrade laboratory environments.</p>	<p>SHECU developed a policy and action plan on workshop health and safety issues. Workshop and training programs are offered to Chulalongkorn University community members.</p>	<p>In 2019, SHECU provided training courses on basic, chemical, biological and radioactive safety to more than 7,500 staff members and students.</p> <p>Data from the chemical inventory program (ChemTrack&amp;WasteTrack) will be combined with Building Information Modeling (BIM) for risk prevention and analysis.</p>
5.7 Student recruitment	<p>Total new undergraduate students: 6,740</p>		<p>Total new undergraduate students: 6,552</p> <p>Total new graduate students: 4,229</p>

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
			Chulalongkorn University utilizes the Thai University Central Admission System (TCAS) as the main system for undergraduate student recruitment.
<b>6. Land use and biodiversity</b>			
6.1 Land and building reuse (brownfield development adaptive renovations)	<p>1. 100th Anniversary public park was completed in 2016 and has become an urban oasis for the university and surrounding communities.</p> <p>2. A policy was developed to turn vacant unused campus buildings into green leisure areas.</p> <p>3. Chaloem Rajakumari 60 Building park was designed and opened as an art space and urban farm for recreation and student activities.</p>	<p>CU Plearn Space (Play+Learn), a co-learning space, opened to students after renovation of an old lecture hall. During examination weeks, the space is open 24/7. Additional co-learning spaces will be provided in 2019-2020.</p>	<p>- Two co-working spaces for students were completed in early 2020.</p> <p>- The Chamchuri 14 building was completed in 2019. This 18-story, multi-functional building was built on a vacant land plot next to the National Stadium to support ever-growing academic activities.</p>
6.2 Landscaping impact and biodiversity		<p>Number of species on campus:</p> <p>Trees 260 Birds 137 Insects 12 Non-insect invertebrates 10 Amphibians 8 Reptiles 20 Mammals 6</p>	<p>In 2019, the university initiated the “big tree” project. The objectives were to improve the well-being of on-campus trees and to enhance the aesthetic green landscape of the campus. Landscape architects, biologists and arborists have developed a routine for monitoring the health of the green environment and applying preventive treatment for unhealthy trees.</p> <p>The survey results showed that there are more than 2,800 big trees on campus, of which 15% are raintrees (<i>Albizia saman</i>), 15% are Burmese rosewood (<i>Pterocarpus indicus</i>), 7% are Pink trumpet trees (<i>Tabebuia rosea</i>) and 6% are Yellow poinciana (<i>Peltophorum pterocarpum</i>).</p>

# Principle 3: Integration of facilities, research and education

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
<b>1. Integration</b>			
1.1 Programs and projects that connect facilities, research and education	Events related to the environment and sustainability: 124	Events related to the environment and sustainability (average for the past 3 years): 47	Events related to the environment and sustainability (average for the past 3 years): 127
1.2 Labeling of courses that have an integrated perspective on sustainability as a key component	Courses that have an integrated perspective on sustainability as a key component: 1,202	Courses/subjects offered that are related to sustainability: 1,241	Courses/subjects offered that are related to sustainability: 1,331
	Total courses offered: 11,385	Total courses offered: 11,102	Total courses offered: 12,068
1.3 Cross-disciplinary courses and/or research	<p>As a comprehensive university, Chulalongkorn University offers a total of 451 undergraduate and graduate programs, of which 38 involve multi-disciplinary and cross-disciplinary education. For example, the newly established School of Integrated Innovation offers an undergraduate program in Integrated Innovation. The Graduate School offers a program in Environment, Development and Sustainability and another program in Technopreneurship and Innovation Management and Sustainability. Other offerings include Cultural Management and Risk and Disaster Management.</p> <p>In the research field, the university has supported the development of 15 research clusters in which most, if not all, are cross-disciplinary and aligned with the United Nations Sustainable Development Goals (SDGs). Examples of such clusters include Climate Change (SDG 13), Food and Water (SDG 2 and 14), Energy (SDG 7), Innovation in Arts and Culture (SDG 11), Tele-Health (SDG 3 and 9), and ASEAN (SDG 16).</p> <p>The university has also established the Second Century Fund program with the goal to support the development of top talent, establish high-end infrastructure and an international ecosystem, enhance strategic academic and research partnerships, and incubate high-impact programs that help solve social, environment and economic problems at both national and international levels.</p> <p>To date, five programs have been initiated from the College of Population Science (Chula Ari), the Institute of Asian Studies (Creative Tourism), the Faculty of Science (CUniverse), the Faculty of Architecture (Design for Society), and the Faculty of Fine and Applied Arts (Multidisciplinary Art Innovation Center).</p>		

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
<b>2. Social integration</b>			
2.1 Programs and projects that connect campus use with industry, government and/or civil society	<p>The CU Social Engagement program was initiated to cover Bangkok, Saraburi, Nan and Chon Buri provinces:</p> <p>1. Number of projects under One Functional Unit-One Community (OFOC): 97</p> <p>2. Number of projects under the Strengthen Saraburi program: 14</p>	<p>The CU Social Engagement program covers Bangkok, Saraburi, Nan and Chon Buri provinces:</p> <p>1. Number of projects under One Functional Unit-One Community (OFOC): 40</p> <p>2. Number of projects under the Strengthen Saraburi program: 19</p>	<p>Number of projects under the CU Social Engagement program: 17</p> <p>Number of communities engaged: 73</p> <p>In addition to Chulalongkorn University Unisearch which serves the research and development (R&amp;D) needs of both public and private organizations, the university has set up the CU Innovation Hub with a mission to support entrepreneur development and community development as well as to commercialize deep technology research.</p> <p>With a goal to develop a core technology platform and to develop links with industry on AI, data science and robotics, the University Technology Center (UTC) was also established in 2019.</p>
2.2 Programs to further student interaction and social cohesion on campus	No data	<p>1. Projects related to personality and leadership: 5</p> <p>2. Projects related to morals and ethics: 60</p> <p>3. Projects related to social responsibility: 7</p> <p>4. Projects related to international affairs: 9</p>	<p>1. Projects related to personality and leadership: 5</p> <p>2. Projects related to morals and ethics: 71</p> <p>3. Projects related to social responsibility: 5</p> <p>4. Projects related to international affairs: 22</p>

# Principle 3: Integration of facilities, research and education

Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
2.3 Behavioral programs aimed at more sustainable actions by students, staff or external community members	Student organizations related to the environment and sustainability: 127	Student projects related to the environment and sustainability: 208	Student projects related to the environment and sustainability: 180

### 3. Research and education projects related to laboratory/IT facilities and sustainability

3.1 Research and education on mitigating hazardous waste from research and IT facilities	The Center for Safety, Health and Environment of Chulalongkorn University (SHECU) is responsible for research and education on mitigating hazardous waste from research facilities. More information can be found at <a href="http://www.shecu.chula.ac.th">www.shecu.chula.ac.th</a> .		
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### 4. Resources committed to campus sustainability

4.1 Organization-wide sustainability policy that integrates academic and operational issues	<p>Sustainability is one of the key issues identified in the university's strategy for 2017-2020. The university set up its Committee on Sustainability in 2017 to help integrate academic activities with operational and management processes. With the aspiration to be a university that combines academic excellence with social and environmental responsibility, Chulalongkorn University has applied the Sufficiency Economy Philosophy of the late King Rama IX and the Sustainable Development Goals adopted by the United Nations to drive the institution.</p> <p>To achieve its sustainability goals, the "Announcement of Chulalongkorn University Related to the Sustainable University Policy B.E. 2560 (2017)" outlines activities to be carried out in five areas:</p> <ol style="list-style-type: none"> <li>1. Infrastructure and Physical Features</li> <li>2. Development for Staff Living Conditions</li> <li>3. Resource and Environmental Management</li> <li>4. Teaching and Research Aspects</li> <li>5. Administration and Social Engagement</li> </ol>		
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Topic	Initiatives and Results		
	Performance 2016-2017	Performance 2017-2018	Performance 2018-2020
4.2 Commitment to external sustainability principles	<p>Chulalongkorn University has established connections with national and international organizations and participated in sustainability programs and rating schemes. The networks include:</p> <ol style="list-style-type: none"> <li>1. International Sustainable Campus Network (ISCN)</li> <li>2. Asian Sustainable Campus Network (ASCN)</li> <li>3. Sustainable University Network of Thailand (SUN Thailand)</li> <li>4. South East Asia Sustainability Network (SEASN)</li> </ol> <p>Rating Schemes:</p> <ol style="list-style-type: none"> <li>1. Times Higher Education Impact Rankings</li> <li>2. UI Green Metric World University Ranking</li> </ol>		
4.3 Dedicated resources (processes, human and financial resources) for campus sustainability	<p>Total research funds dedicated to environment and sustainability research: \$18,502,815 (592,090,085 THB)</p>	<p>Total research funds dedicated to environment and sustainability research: \$21,648,820 (697,626,891 THB)</p>	<p>Total research funds dedicated to environment and sustainability research: \$27,612,494 (840,110,129.95 THB)</p>



# NO POVERTY

## ขจัดความยากจน

End poverty in all its forms everywhere

ขจัดความยากจนทุกรูปแบบ ทุกสถานที่

1  
NO  
POVERTY



### The Chula Rural Project: Giving poor students a chance

Many youngsters from poor families in rural areas have been deprived of the opportunity to further their studies despite good academic performance. To reduce this educational gap, the Chulalongkorn University has established a number of scholarship programs for underprivileged students.

One such initiative, the Chula Rural Project, aims to help young people realize their dreams to pursue higher education. The project covers not only tuition fees but also living allowances and other personal expenses, including medical care, with no conditions attached.

The scholarship program relieves students' families of the burden of providing funds for their children and also opens doors to college education for youngsters who otherwise would have been deprived of opportunities to better their future. Chulalongkorn University has committed a yearly budget of over 50 million baht to the project.

### Raising pigs for food security

How can we achieve food security and safety? In the northern Thai province of Nan, raising pigs is an important part of a strategic plan to ensure that goal is reached. Chulalongkorn University is glad that it can lend a hand to move the plan forward.

Through its Center of Learning Network for the Region (CLNR), the university supports the School of Pig Farming Demonstration Project in Wiang Sa and Muang districts of Nan.

Since 2006 the project has been training small-scale farmers to artificially inseminate pigs with an aim to help them to become self-reliant. As well, the project also trains disadvantaged young people in the practices of pig farming, which could become a future career choice for them.

### Frogs (and earthworms) help launch careers

More people eat frogs, particularly the legs, than many of us realize. Most of these frogs come from the wild, raising concerns about possible extinction of some species.

These amphibians are also popular as food in many parts of Thailand. Seeing this as an opportunity for career promotion, the Center of Learning Network for the Region (CLNR) of Chulalongkorn University has launched a project to train farmers on techniques to raise frogs and earthworms.

In the initial stage, 30 farmers from Wiang Sa district of Nan province participated in training led by Sakchai Manopak, head of the Nan Area Management Group. The training focused on technical knowledge of farming based on the sufficiency economy philosophy.

### Growing food organically earns more

Everyone agrees organic food is good for health. What people may not know is that it can be financially rewarding for growers as well.

In Nan, maize farmers typically make heavy use of chemicals to grow their crops. To steer them toward chemical-free cropping, the Chulalongkorn University School of Agricultural Resources (SAR) — in cooperation with the convenience store chain Lemon Farm and the Thai Health Promotion Foundation — has launched the Organic Farmers Network Development Project.

The project promotes the production of organic food for healthy consumption using the Participatory Guarantee System (PGS) as a tool to design a complete food chain.

The first group of participants consisted of 57 farmers who agreed to grow their produce organically without the help of chemicals. They were trained to undertake soil improvement to conform with organic agriculture standards.

After more than a year, some of the farmers are earning up to seven times what they earned before.





# ZERO HUNGER

## ขจัดความหิวโหย

End hunger, achieve food security and improved nutrition and promote sustainable agriculture

ขจัดความหิวโหย บรรลุความมั่นคงทางอาหาร ส่งเสริมเกษตรกรรมอย่างยั่งยืน

2 ZERO HUNGER



## Capital Lunch

Poverty and hunger used to afflict a large number of students, particularly those from upcountry. Despite decades of economic progress, the problem remains today.

In 1972 the Chulalongkorn University Alumni Association under the King's Patronage led by its president, Prof Dr Boonrawd Bintasan, launched the Capital Lunch program to provide free lunches for poor undergraduate students who demonstrate good conduct. Initial funding of 300,000 baht came from the Foundation for Education and Public Welfare. Lunch, consisting of nutritious dishes, fruit and milk, was served at the alumni association between 10am and 2pm daily.

About 450 students benefit from the program, which has an annual budget of 3 million baht.

## Elevating food safety in communities

Chulalongkorn University takes the issue of food safety seriously, which is why it created the USAFE: Food Safety – Food For All initiative. The objective is to monitor the quality and safety of food served by outlets in all areas for which the university's property management arm is responsible, including Siam Square.



The project corresponds with a campaign by the Bangkok Metropolitan Administration (BMA) to make Bangkok a "Food Safety City". As well, it complements the Chula Care strategy that aims to build and strengthen good relations with communities as part of the university's corporate social responsibility mission.

## 'Lunch distancing': Free lunch in the time of Covid

The COVID-19 pandemic has affected everybody, but its impact has been especially hard on the poor. TACT — a social enterprise formed by a group of Chulalongkorn University alumni to promote social innovations and utilize youth potential, in partnership with the Equitable Education Fund (EFF) — has initiated a project called "Lunch Distancing" to provide food assistance to poor children in two pilot locations: the Wat Hong Rattanaram Community and the Port Railway Community.

The project works by recruiting student volunteers as "student buddy" distributing coupons that can be used to pay for food at participating community restaurants. To reduce the risk of contracting COVID-19, social distancing is maintained to prevent the spread of the coronavirus and ensure safety for everyone.'



# GOOD HEALTH AND WELL-BEING

## สุขภาพและความเป็นอยู่ที่ดี

Ensure healthy lives and promote well-being for all at all ages

รับรองการมีสุขภาพและความเป็นอยู่ที่ดี  
ของทุกคนในทุกช่วงอายุ

**3** GOOD HEALTH  
AND WELL-BEING



### **Pattani Model for better virus tests**

Effective test kits that deliver quick results are an essential tool to fight the spread of COVID-19. The Chulalongkorn University Faculty of Pharmacy has developed such a tool, called the Baiya Rapid COVID-19 IgM IgG Test Kit.

The kit tests for Immunoglobulin M and Immunoglobulin G (IgM and IgG) antibodies to identify potential infections in asymptomatic people.

In addition to the COVID-19 screening service that was provided for Chulalongkorn University community members through the Chulalongkorn University Health Center, the university has collaborated with the Pattani provincial administration to launch the “Pattani Model” project, aimed at creating a community management system to contain COVID-19 infections.

Data collected through testing will form the basis of a system that the team can use to study herd immunity among the target population.

### **Citizen engagement against rabies**

Each year more than 60,000 people around the world die from rabies, according to statistics from the World Health Organization. In Thailand in recent years, rabies deaths have ranged from 5 in 2014 to 18 in 2018, according to the Disease Control Department.

To help the global effort to achieve zero human rabies deaths by 2030, the Faculty of Veterinary Sciences has launched a “Citizen Engagement Against Rabies” project. The aim is to create a community model that emphasizes disease prevention and birth control of the dog and cat populations.

Kambong subdistrict in Ban Phue district of Udon Thani province is the pilot site for the three-year project running from 2018 to 2020, and it has been highly successful in which all dogs and cats were vaccinated, resulted in the reduction of rabies risk in the community and provided a disease prevention model for other communities in Thailand.

### **Psychology knowledge shared to build understanding**

With the world undergoing rapid changes, uncertainty is a fact of life, leading to more stressful living. For many people, access to psychological assistance has become a matter of acute urgency.

With that in mind, the Faculty of Psychology at Chulalongkorn University has devoted great effort to providing access to its extensive vault of knowledge to the public. Information is disseminated through two main channels. A blog — Smarter Life by Psychology — assembles feature-length academic articles. A Facebook page — PsychologyChula — provides more easily digested information to the wider public.

The faculty attempts to provide timely information on issues of public interest, such as cyber bullying and effects of PM2.5 air pollution, in the form of articles or interviews with experts.

In addition, the faculty has produced interviews with lecturers and experts in various psychological fields for broadcast through the Chulalongkorn University radio network. These programs are accessible online as podcasts for later listening.

### **Improving quality of life through Chula HealthStreet**

Thailand’s urban areas have been expanding rapidly and are now home to 50% of the country’s population, with Bangkok alone accounting for about 15%.

The College of Public Health Sciences has launched an innovative program called Chula Health Street, aimed at promoting healthful living in communities using a participatory model.

Operating under the CU Community Engagement Project, Chula Health Street uses an innovative community model to promote physical and mental health as well as quality of life among residents of targeted communities.

Community members receive holistic care through counseling provided by a network of university faculty members. The goal is to empower them to be able to develop their own communities through real-life experiences.

Members can take courses, participate in various research projects and take part in activities to build friendship, trust and confidence between the university community and surrounding neighborhoods.

### **‘Chula Ari’ for an aging society**

In 2021 Thailand will become a fully-fledged aging society with about 13 million people or 20% of the population over age 60, according to the Office of the National Economic and Social Development Council.

Twenty years from now, Thais 60 years of age or older are expected to represent one-third of the population.

The Chulalongkorn University Platform for Aging Research Innovation (ARI) aims to respond to this challenge. Called “Chula Ari” for short, the project aims to conduct policy research in an attempt to answer the social needs of the future gray society. Studies are supplemented by actionable research for area-based approaches that can be implemented in practice.

The project is also expected to create new knowledge and innovations and produce young researchers with expertise in serving the aging society.

More than 70 academics, researchers and students are participating in the project, which is a cooperative effort of 12 academic faculties: Medical Science, Dentistry, Nursing, Psychology, Allied Health Sciences, Engineering, Architecture, Communication Arts, Law, Political Science, Arts, and the College of Population Studies.

Project participants have contributed to the drafting of the Third National Aging Society Policy.

“We are developing a system to serve the special needs of the aging population in Bangkok,” says Prof Dr Vipan Prachuabmoh, dean of the College of Population Studies. “At the same time, new innovations will be designed to enhance the lives of the burgeoning aging society in the future.”

### **Chula Student Wellness Center**

University study is a highly stressful pursuit. Students who find it hard to cope sometimes either drop out or engage in unhealthy lifestyles, such as taking alcohol or drugs. As part of its overall wellness strategy, Chulalongkorn University has established the Chula Student Wellness Center, which offers psychological services for both students and staff.

### **SHECU raises environmental health and safety awareness**

The issues of safety, health and the environment sometimes receive less attention than they deserve from businesses and other organizations.

Chulalongkorn University has responded to this challenge by establishing the Center for Safety, Health and Environment (SHECU) to promote awareness of these issues.

In line with the university’s strategic plan (2017-21) for safety, health and the environment, SHECU develops, manages, monitors, supports, co-ordinates and provides services to units within the university. Its goal is to create a zero-accident organization by 2021 and an exemplary organization for sustainable SHE management by 2022.



# QUALITY EDUCATION

## การศึกษาที่เท่าเทียม

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

รับรองการศึกษาที่เท่าเทียมและทั่วถึง  
ส่งเสริมการเรียนรู้ตลอดชีวิตแก่ทุกคน



**80+**

Online courses for everyone from 5 clusters (Management Sciences, Information Science and Technology, Linguistics, Arts and Self-development, Health)

**270,000+**

Learners registered for online courses (MOOC)

**1,405**

People have completed online courses since March 2019



## Chula MOOC: online learning for everyone

Lifelong learning is unquestionably a global trend. Millions of people of all ages are coming back to school via online platforms. In response to overwhelming public demand for access to higher learning, Chulalongkorn University has designed more than 30 online courses for its Chula MOOC (Massive Open Online Course) program.

The courses include content relating to digital skills, IT, health, art and self-development. Anyone from anywhere regardless of age, race or educational background can have access to these courses free-of-charge as long as they have an internet connection. In AY2019, there were more than 270,000 MOOC registered learners that enrolled in the 49 MOOC Courses. In addition, to meet the demand from the public sector, the CHULA MOOC Achieve program was set up as a paid-program offering the Data Science Pathway and the Persuasive Presentation and Negotiation Pathway. For more information, please visit <http://mooc.chula.ac.th>

## Improving teachers' digital literacy

Technological disruption has touched every facet of life and digital literacy has become ever more important. The Faculty of Engineering at Chulalongkorn University has teamed up with Learn Education, a social enterprise that aims to improve education in Thailand through technology and innovation and to increase digital literacy among teachers through an e-learning system called TrainKru. The project will provide an online platform that gives teachers, even those in remote areas, 24/7 access to instruction in software proficiency, algorithmic literacy as well as computer languages including Python. As of October 2020, more than 400,000 people had visited the TrainKru website (<http://trainkru.com>) with more than 13,000 registered learners across the country.


## The 10+ policy helps pandemic-affected students

“Chulalongkorn University has a policy that no student should ever have to stop learning for financial reasons,” said Asst Prof Chaiyaporn Puprasert, vice-president for Student Affairs. Many students and their families have been hit hard financially by the COVID-19 pandemic. To help relieve their financial pressure, Chulalongkorn University has introduced the 10+ policy to help students in the Academic Year 2020, including cutting tuition fees by 10% and offering over 5,000 scholarships and monthly allowances. The help adds up to a total funding of around 500 million Thai Baht.

## Chulalongkorn University Learning Innovation Center

In response to the ways we teach and learn in 21st century, Chulalongkorn University set up the Learning Innovation Center (<http://lic.chula.ac.th>) in 2017 to support the Learning Innovation for Lifelong Education (LiLLe) with the goal to enhance learning methods that promote 21st century skills and to create the lifelong learning community for Thailand. To meet the abovementioned goals, the on-campus learning process and learning environment have been adjusted. For example, facilities that support active learning model such as smart classroom and interactive design workspace were provided. In addition, online lectures, online (VDO) library, and online courses were generated to promote lifelong learning for Chulalongkorn University students and general public. In AY2019 all academic units of the university collaborated with the Learning Innovation Center in which approximately 80% of the undergraduate academic programs had incorporated the active learning transformation in their programs.


**CHULA**  
MOOC

Supporting Our Chula Students 

### 10+ POLICY

**10% tuition reduction for all students**  
\*Specific fee reductions to be determined by each department\*

<b>Scholarships</b>	<b>Scholarships for Undergrads</b> (4,500 scholarships)	<b>Scholarships for Grads</b> (142 scholarships)
<b>Financial Aid</b>	<b>Student Welfare</b> (4,000 students)	<b>On-Campus Jobs</b> (100 - 500 THB per day)
<b>Dormitory Student Welfare</b> (Reduce up to 100%)	<b>Free Internet SIMs</b> (3,000 SIMs)	<b>Additional Measures</b> (Health care++)

Chula Communication Center  Chula - Chulalongkorn University



# GENDER EQUALITY

## ความเท่าเทียมทางเพศ

Achieve gender equality and empower all women and girls

บรรลุความเท่าเทียมทางเพศ พัฒนาศักยภาพสตรีและเด็กผู้หญิง

**4,367:5,920 (0.74:1)**

Gender ratio of full-time STEM students  
(Science, Sport Science, Engineering,  
Petroleum and Petrochemicals):  
female:male

**346:535 (0.65:1)**

Gender ratio of full-time STEM  
staff: female:male

**24:51 (0.47:1)**

Gender ratio of administrative  
staff: female:male

**5** GENDER  
EQUALITY



### Breaking the 'glass ceiling'

While Thailand has made significant progress in many social spheres, gender equality still lags far behind. To promote gender equality, Chulalongkorn University commissioned outside researchers to conduct a study to identify factors that would lead to a more equal gender environment in its communities.

The research report published in 2018 – “Equal Opportunity and Gender Enabling Environment in the Promotion of Gender Equality in Chulalongkorn University” – aimed to create a body of knowledge and forge an understanding of the issue of gender equality among university staff, from administrators on down to the rank-and-file.

It found, among other things, that while female faculty members were capable of climbing the academic ladder, they often hit the same “glass ceiling” that women in other segments of society do.

The study recommended that the university adopt policies that support equality in all dimensions and launch campaigns to educate people on the relevant concepts, especially that of gender equality.

### Transgender ceremony and identity

A commencement ceremony is considered a big event everywhere. But in Thailand, where customs and social values play a large role in strictly dictating people’s conduct, going against the norms is daunting, to say the least. However, for one dentistry graduate, the big day was extraordinarily special.

Watcharapong Srimalai, DDS, better known as “Dr Lalabelle”, 24, is a graduate of the Faculty of Dentistry and a transgender. How to dress for the ceremony in 2017 was a dilemma for her. Should she dress according to her biological gender or her preferred choice of identity? She chose the latter and to her great relief the university agreed to her request.

She said she felt overwhelmed by a sense of acceptance and equality as a result. The icing on the cake was when her name was called to accept her degree; it was not prefixed with the title “Mr” as was the custom. On that day, Dr Lalabelle basked happily in the circle of her family and friends.

### Women in limitless 'space'

Spaces that used to be traditionally occupied by men — in top management, leadership, politics or even in academics — are now being challenged by women, especially those of the new generation.

Speakers at a symposium held in 2019 by Chulalongkorn University, entitled “Women in Limitless Space”, shed light on the progress made to date and the challenges that remain. Panelists urged young women to relentlessly pursue education and fight their way up the career path to the top space where men have dominated in many areas.

As part of a celebration on the roles of prominent women in Southeast Asia, the symposium was jointly organized by the Japanese Embassy, the Geo-Informatics and Space Technology Development Agency (Gistda) of Thailand, and C asean, a platform for ASEAN networking.

A special guest was Dr Mukaisai Kibo, the first Asian female astronaut. In a session on “Nurturing Women of the Next Generations”, Dr Kibo’s message to the young generation of women was loud and clear: “Space” is now limitless for women.

### Unique tour promotes gender equality

Biases and violence toward LGBT groups are ubiquitous even on university campuses, where freedom of expression in gender identity is expected to be tolerated more than in the society at large. To tackle this issue, Chulalongkorn University together with other leading universities in Thailand jointly organized a unique event — “HeForShe University Tour: Bring Gender Equality to Your Campus” in 2019.

The event included a forum featuring discussions, debates and verbal accounts of violence towards people with different gender identities. This triggered new perspectives and understanding among university students about gender equality.

In a nutshell, the HeForShe project aimed to encourage all genders to stand in solidarity with women to create a bolder and more gender-equal world.

### Pushing ahead to solve migration problems

Global society today faces a wide range of complex challenges, many of them inter-related. They include climate change, statelessness, refugees, displaced persons, human trafficking and modern slavery, migrant workers and gender identity. Chulalongkorn University’s Institute of Asian Studies (AS), together with the Asian Research Center for Migration (ARCM), and the Asean Commission, took up the challenge to seek solutions.

A seminar on “Migration and SDGs: Asean and Beyond — A Pathway to the 2030 Agenda” took place on December 17-18, 2019, to solidify academic cooperation and networks in searching for inclusive and sustainable solutions for the challenges facing the global community.

### Unsung heroes of COVID-19 are mostly women

Time and again, women worldwide have proven themselves to be effective leaders in times of crisis, valued for their compassion and communication skills, among other things. Those qualities were clearly evident during the COVID-19 crisis in Thailand, said speakers at a seminar titled “Lessons from Women Leaders in Crisis: How Should Leaders Respond to the COVID-19 Crisis?”

Organized by Chulalongkorn University’s Sasin School of Management, the seminar in May 2020 noted the example of female leadership among health volunteers who played a major role in successfully containing the pandemic in Thailand.

In March 2020, the World Health Organization also praised Thailand’s network of one million health volunteers, staffed mainly by women, as “unsung heroes” in protecting communities nationwide from infection.



# CLEAN WATER AND SANITATION

## การจัดการน้ำและสุขาภิบาล

Ensure availability and sustainable management of water and sanitation for all

รับรองการมีน้ำใช้ การจัดการน้ำและสุขาภิบาลที่ยั่งยืน

6 CLEAN WATER AND SANITATION



101

Clean water dispensers installed to encourage students to fill their own bottles instead of buying

### **Water diplomacy: Winning the water war with innovation**

Managing risks associated with water resources is essential to alleviate damage and the consequences of natural disasters such as flooding and drought, and to increase agricultural productivity to ensure food security for the country.

Several water resources management models focusing on water security, consumption and quality were highlighted at a forum titled “Water Diplomacy: Where Local Wisdom Meets International Excellence”. The event was jointly organized by Chulalongkorn University and the Office of the National Water Resources (ONWR) in November 2019.

One of the innovations presented by the university was a risk map showing the vulnerability of water sources to contamination, from surface water to groundwater, which will eventually affect water quality. The information can assist in city planning and can reduce the risk of water from problem areas being used in agriculture and industry.

### **Envi Mission: Creating a water-saving culture**

Given that water is an essential part of life, Chulalongkorn University believes it has a role to encourage young people to realize the importance of water resources.

In cooperation with CU Radio and S.Napa (Thailand) Co., Ltd., the university in 2019 launched a contest calling on high schoolers to propose solutions to water issues in local communities. More than 200 teams applied, and 40 were selected to attend a three-day water saving boot camp at the Center of Learning Network for the Region in Saraburi province. An educational board game was also designed as a medium for learning about water resource management.

The students were able to produce several impressive ideas that could have real-world application. Examples included a team that proposed a solar-powered device made from recyclable materials that is able to both collect waste in waterways and treat wastewater. Another team proposed forming a youth network to study drought problems in their communities and find solutions.

### **Water-saving campaigns at Chulalongkorn University**

Water is precious and should be conserved by any means possible. Chulalongkorn University takes water conservation seriously. Because it has large green areas, the university has resorted to using rainwater and treated wastewater, rather than the municipal water supply, to keep the grass and trees green. Each day, the university’s 6,000-liter water truck pumps up water collected in artificial ponds to water the greenery.

In order to be reused, wastewater from university buildings needs to be treated properly. An ongoing study on wastewater treatment procedures on campus aims to propose conceptual designs to improve the treatment process in each of the university’s buildings. For water usage reduction, water-saving hardware, such as sensor-equipped sink faucets, is being installed in washrooms across the campus.

In addition, Chulalongkorn University has constructed and maintain artificial ponds all over the campus. They are not just for landscaping purposes but also collect rainwater and retain treated wastewater from surrounding buildings. The ponds are meant to promote effective use of recycled water and reduce the volume of runoff released to neighboring communities. In the long term, the university plans to increase the number of ponds to boost its water storage capacity and make more efficient use of high-water volume during the rainy season

### **Water sanitation and sampling workshop**

As part of Chulalongkorn’s continuing effort to promote SDG6: Clean water and sanitation, the university has engaged with civil society to raise awareness and provide academic services to local administrations. For example, in cooperation with the Office of Natural Resources and Environment of Chachoengsao Province, the Environmental Research Institute Chulalongkorn University (ERIC) held a workshop on water quality monitoring in 2018. The workshop drew 128 participants from 11 districts in the eastern province. They received advice on three major topics: (1) sample collection and water quality analysis using test kits; (2) using a computer program for water quality reporting in Chachoengsao (on the provincial office’s website); and (3) identifying additional locations for water quality monitoring and testing.

In 2019, the Center of Learning Network for Region (CLNR) held a workshop on water sanitation and sampling for 40 local administration chiefs in Nan province. Aiming to help improve the water quality analysis process, the workshop focused on water sample collection procedures, proper transport of samples, and primary interpretation of test results.



# AFFORDABLE AND CLEAN ENERGY

พลังงานสะอาดที่ทุกคนเข้าถึงได้

Ensure access to affordable, reliable, sustainable and modern energy for all

รับรองการมีพลังงานที่ทุกคนเข้าถึงได้ เชื่อถือได้ ยั่งยืนกับสมัย

**7** AFFORDABLE AND CLEAN ENERGY



**206**

university buildings to be equipped with CU Building Energy Management System in 2 years

**50%**

of university buildings to have solar rooftops installed in the next 3 years

### CU promotes solar rooftops

Solar energy is all the rage now and for good reason. It yields clean and free power, and solar panels today cost 90% less than they did a decade ago.

The Energy Research Institute (ERI), as a consultant for the Office of Physical Resources Management of Chulalongkorn University, investigated the technical and economic feasibility of installing solar panels on the university's buildings (excluding Chulalongkorn Hospital) in 2017. The study of 216 buildings and 15 covered walkways found that the university potentially has a solar rooftop capacity of 17.9 Megawatts (alternating current [AC] rating). Consequently, the university plans to install solar panels on more than 100 of its buildings in the coming years.

In September 2020, the university finished installing solar panels over one of its car parks covering 4,000 square meters of rooftops with a total capacity of 770 kilowatts (kW). The PMCU Solar Carpark, as it's known, is expected to save the university about 4.4 million baht or US\$141,000. The project was conceived through the Chula Smart City plan.

### Monitoring system helps save energy in buildings

Energy saving depends in part on meticulous monitoring of users' energy consumption patterns. A team from the Faculty of Engineering's Smart Grid Research Unit (SGRU) has devised a system to monitor and verify power consumption in a building and share that information with all residents and users.

Called CU Building Energy Management System (CU-BEMS), the system not only controls energy usage in a building, via usage profiling, classification and visualization, but also prompts changes in energy consumption behaviors of occupants to meet energy efficiency targets.

The first smart meters were installed at the Department of Electrical Engineering buildings in 2014. More recently they have been installed at the Chamchuri 5 administrative building, as part of the university's energy-saving campaign.

CU-BEMS is a collaborative project with the University of Tokyo, local and international industrial partners. It received funding from the Energy Conservation Fund of Thailand's Ministry of Energy.

### DR-100 helps homeowners save energy

DR100 is a system to help homeowners monitor and control energy usage. Through a tablet, the homeowner learns how much energy was used in the previous month and how much is being currently used. It also controls air conditioners and sets limits on energy usage. The goal is to help the homeowner reduce energy expenses.

The first pilot project, with support from the Energy Policy and Planning Office (EPPO), explored the technical feasibility of real-time Demand Response (DR) using a central load aggregator with 100 households across the country, hence the name DR100. Preliminary test results have been satisfactory. The EPPO has incorporated the project expansion into its plan.

### From plants to super-clean liquid fuels

Thailand is a major agricultural producer, and that inevitably includes large volumes of agricultural waste. But waste can be valuable with the right management. Chulalongkorn University is collaborating with Japan's University of Toyama in a five-year project (2017-21) to investigate new ways to transform farm residues and waste into liquid fuels, such as diesel, gasoline, LPG or methanol. The researchers are also exploring the social impacts of the technologies as well as developing human resources.

The Project for Comprehensive Conversion of Biomass and Waste of Super Clean Fuels by New Solid Catalysts is funded by the Japan International Cooperation Agency (JICA) and the Japan Science and Technology Agency (JST).

### Research efforts on renewable energy

Renewable energy development is an area of great interest among researchers in the Energy Research Cluster at Chulalongkorn University. They are placing emphasis on innovations and bioenergy to promote the bioeconomy. Research topics include: "Catalytic critical process for thermal conversion of industrial waste"; "Switchable transparent photovoltaic cells"; "Development of organic photosensitizing materials for optoelectronic applications, especially organic solar cells and photo-electrochemical catalysts"; "Biodiesel production from palm oil using an ultrasonic reactor and reactive distillation"; and "Utilization of microalgae for renewable energy production".

### Workshops and seminars

Workshops and seminars on energy development are held regularly at Chulalongkorn University in a collaborative effort with both internal and external parties.

- The university's Energy Research Institute (ERI) works closely with the Ministry of Energy to outline energy plans and policies for Thailand. Among the activities they organized together was a seminar in October 2019 at which ERI experts examined the draft Alternative Energy Development Plan 2018 (AEDP2018), and a study for a suitable ratio of power plants in Thailand under the national Power Development Plan (PDP), in order to support the "prosumer" trend.

- The Center of Excellence in Electrical Power Technology, together with the Smart Grid Research Unit (SGRU), organized technical workshops and seminars, such as a "Smart Building Data Analytics Workshop", a seminar on "Using SINCAL Program for Electrical System Analysis and Planning", and a seminar on "Energy Management Systems".

- The Center of Fuels and Energy from Biomass jointly established bioenergy plants with the Small and Micro Community Enterprise (SMCE) project in Chon Buri, Samut Songkhram and Lop Buri provinces. The plants produce and sell charcoal briquettes and activated charcoal made from leftover bamboo and wood.



# DECENT WORK AND ECONOMIC GROWTH

## งานที่มีคุณค่า และการเติบโตทางเศรษฐกิจ

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

ส่งเสริมการเติบโตทางเศรษฐกิจที่ต่อเนื่อง  
ครอบคลุมและยั่งยืน การจ้างงานที่มีคุณค่า

8 DECENT WORK AND ECONOMIC GROWTH





## CU-ColLaR promotes labor research

Goal 8 of the UN's Sustainable Development Goals aims to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. To achieve that goal, the Labor and Management Development Center of Chulalongkorn University, has joined forces with the National Labor Research Center of the Ministry of Labor to establish a center to foster knowledge-based collaboration with public and private academic institutes in Thailand and around the world.

Known as CU-ColLaR, (Chulalongkorn University Collaboration Center for Labour Research), the center aims to integrate knowledge and pool data on local labor conditions and trends to support comprehensive labor research. The resulting research, it is hoped, can be used to inform policy-making decisions to develop a dynamic network of local and international workers equipped with a competitive edge in the 4.0 era.

While pushing ahead to help achieve sustainable economic growth, the center will also focus on developing an inclusive policy to improve the quality of life of more than 40 million Thai workers, as well as those who are preparing to enter the labor market for the first time and those leaving it.

The framework of the research will cover the following areas:

- Private returns to STEM education and implications for countries in the middle-income trap: evidence from Thailand;
- Impacts of computerization and the aging society on the Thai labor market;
- Estimating the effects of board governance on corporate policies using demographic identification;
- Patterns of recruiting and personnel development for the future labor market. Case study: the automobile and auto parts industry;
- Role of skill development and innovation on efficiency and wages;
- Review of knowledge bases and models for export of care providers for the elderly from Thailand;
- Study of an appropriate social insurance program for fishery workers;
- Study of problems relating to access to social welfare and social insurance by workers in the platform economy, and a policy proposal from a study of labor in the hired transport sector;
- Thai laborers in Taiwan: trends in the market, working conditions, worker protection, health, debts and the return of skilled labor to Thailand;
- Appropriate approaches for Thailand to use social dialogue as a tool to develop labor rules;
- Project to develop delivery and shuttle taxi motorcycle services.

## Preparing students for the working world

Helping students prepare to enter the job market is an important mission of the Office of Student Affairs. Besides knowledge from the classroom, students need other skills in their encounter with “the real world”. Below are some of the projects and activities that the office has initiated for the benefit of students:

- Employment services to currently enrolled students, including job opportunity information and job and educational counseling fairs. In the second week of March each year, the CU Job Fair takes place to provide opportunities for students to meet prospective employers as well as to gain information about further study opportunities. In 2019 the event attracted 3,871 students and 240 companies.

- The Extracurricular Employment Opportunities for Students project provides assistance to economically disadvantaged students. It helps identify employment opportunities for those who are looking for them. Employment allows the students to gain experience and promotes positive perceptions of self-reliance. In 2019, employment undertaken by students amounted to 88,523 hours, yielding monetary benefits of 8,852,300 baht.

- The Personality Development Training for the Job Market Project is an annual event organized by the Chulalongkorn University Wellness Center. Experts on personality development are invited to provide tips and techniques for developing a good personality and how to behave appropriately in different circumstances, which are important traits for the successful launch of a career.



# INDUSTRY, INNOVATION AND INFRASTRUCTURE

## อุตสาหกรรม นวัตกรรม และโครงสร้างพื้นฐาน

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

พัฒนาโครงสร้างพื้นฐานที่พร้อมรับการเปลี่ยนแปลง ส่งเสริมการปรับตัวให้เป็นอุตสาหกรรมอย่างยั่งยืน และทั่วถึง และสนับสนุนนวัตกรรม

**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE

**125**  
startups fostered by the university

**129**  
patents/petty patents issued

**THB 15 billion**  
market valuation created through CU Innovation Hub

## Transforming how Thais live, learn and play

In an age of technological disruption, innovation is the name of the game. The CU Innovation Hub was conceived to nurture creative thinking, critical thinking and entrepreneurial skills among students and employees; foster innovation through research, development and management; and introduce innovations to the broader economy and society.

The center has produced and facilitated several inventive projects. Some highlights include the Siam Innovation District; an effective learning management system (LMS) called myCourseVille; the earth-saving water glass recycling bin; skin-peeling DermaPromp+ socks for diabetics; and HemaYouth, a wrinkle/scar reduction gel made by cytokine from cow platelets. The Innovation Hub also organized the Innovation and Entrepreneurship Winter Bootcamp 2019 for university students interested in startup businesses worldwide.

## Chula joins COVID-19 vaccine search

Chulalongkorn University researchers have joined the fray in searching for an effective vaccine for COVID-19.

The Chula Vaccine Research Center (Chula VRC), in a collaborative effort with the University of Pennsylvania, has developed an mRNA vaccine called CU-Cov19. Financial support has come from the National Research Council of Thailand (NRCT), the National Vaccine Institute (NVI), and Chulalongkorn University.

Testing on monkeys has proved successful. All vaccinated monkeys showed increased immunity to the virus, were healthy and exhibited no side effects. Vaccine trials in humans were taking place between October and December 2020.

## CU Covid innovation

Crises are the mother of invention. With COVID-19 wreaking havoc around the world, the CU Innovation Hub has incubated several startups, whose inventions are contributing to Thailand's fight against the pandemic.

Among them are Shield and Protecting Spray from Nabsolute; a Mobile Negative Pressure Unit; COVID-19 Rapid Test Kit from Baiya Phytopharm; the Lung Care mobile application; the quarantine telepresence robot Krajok and the quarantine delivery robot Pinto from CU-Robocovid; the Ninja & Mobile Robot from Haxter Robotics; the VQ20 and VQ20+HP35 disinfectant dispenser; and the UVC Sterilizer Germ Saber Robot.

## 5G to unlock VR classrooms

The National Broadcasting and Telecommunication Commission (NBTC) and Chulalongkorn University have embarked on a collaborative two-year operation called 5G IT/IOT Innovation Center on campus. The project aims to study and develop virtual reality (VR) classrooms for students, scholars/lecturers, and developers.

Students can take advantage of learning opportunities that offer innovative experiences aided by technology. Scholars and teachers can gain a better understanding of the fast-paced changes in technology to reduce the gap between them and their tech-savvy students. Finally, developers can help modify VR technology to suit Thai educational contexts.

## Open data and applications by Chula

Chulalongkorn University provides a wide range of publicly accessible data, programs and applications. For example, ViaBus, an application developed by three engineering students and later supported by the Bangkok Mass Transit Authority (BMTA), tracks buses in real time and suggests public transport routes in Bangkok. The Chula Pop Bus app helps make navigation through Chulalongkorn University easier.

The Property Management Office of Chulalongkorn University (PMCU) has teamed up with MuvMi, an affordable on-demand vehicle-sharing operator, to offer a ride-sharing service for passengers going in the same direction. The SciMuseum CU app, meanwhile, helps visitors explore the Science Museum in the Faculty of Science.

## Smart farming for Thai dairy producers

A warm and humid climate causes stress on dairy cows, causing them to lose appetite, thus leading to poor health and low quality of milk. To address the issue, the Enhancement of the Force of Chula Toward the 21st Century Project has provided funding to the Faculty of Veterinary Medicine to set up the Center for Research and Technological Transfer for the Development of Dairy Farming in Humid Tropical Zones in Saraburi province.

The research center has introduced several new appropriate technologies at its research farm, such as sensors and animal tracking systems, automation to reduce the use of human labor, and information software. The center also provides training courses of up to six months for dairy farmers at its dairy school. The data gathered is part of a broader research effort to develop the quality of Thai dairy milk.



# REDUCED INEQUALITIES

## ลดความเหลื่อมล้ำ

Reduce inequality within and among countries

ลดความเหลื่อมล้ำทั้งภายในและระหว่างประเทศ



## The Andaman Pilot Project

The Andaman coastline and small islands in Thai territory have long been recognized as one of the world's most attractive tourist spots. The area has also been inhabited for generations by a tribe of sea nomads known as Chao Lay, whose way of life depends on fishing. However, the growth of tourism in recent decades has infringed on their land rights and way of living.

The Chulalongkorn University Social Research Institute has been a partner in the Andaman Pilot Project, a joint project of several stakeholders initiated in 1997 by UNESCO. Focusing on the impact of economic activity on the Chao Lay population, the project attempts to improve security and sustainability of their communities based on their ways of thinking, their closeness to nature and the concept of living together by sharing limited resources.

Knowledge gained from Chulalongkorn University's research and collaboration with the Andaman project has helped the communities to adapt to changes and to be aware of the social and economic conditions of the world.

At the same time, the knowledge acquired stimulates appropriate policy development and strengthens indigenous cultural rights, which has led to an increase in academic services, creative media production and participation from Chao Lay people in defining sustainable development.

## Migration report

Because Cambodia is a key country of origin for migrants in Thailand, it is crucial to analyze migration patterns and for the governments of both countries to design and deliver evidence-based policies, strategies and interventions to maximize the developmental benefits of labor migration.

In 2019, the Asian Research Center for Migration (ARCM) at Chulalongkorn University, in collaboration with the International Organization for Migration (IOM), conducted research and published a report titled "Assessing Potential Changes in the Migration Patterns of Cambodian Migrants and Their Impacts on Thailand and Cambodia".

The report aimed to contribute toward the Cambodian and Thai governments' efforts to develop transparent and rights-based migration policies and programs. Such policies are intended to maximize the positive contributions that migration makes to the economies and societies of both countries.

## Resolving inequality in Thailand

Among the serious problems facing Thailand are the widening gap between the rich and the poor, the economic slowdown, and decades-old political conflicts. These problems have caused great anxiety among citizens, and people are wondering if the country will ever be able to pull itself out of the quagmire.

To address these issues and try to find answers to them, a workshop titled "Reducing Inequalities in Various Dimensions for Sustainable Social Development" was held by the Faculty of Commerce and Accountancy and Oxfam on Oct 29-30, 2019.





# SUSTAINABLE CITIES AND COMMUNITIES

## ชุมชนและเมืองที่ยั่งยืน

Make cities and human settlements inclusive, safe, resilient and sustainable

ทำให้ทั้งเมืองและการตั้งถิ่นฐานของมนุษย์มีความปลอดภัย ทั้งถึงพร้อมรับการเปลี่ยนแปลงและพัฒนาอย่างยั่งยืน

11 SUSTAINABLE CITIES AND COMMUNITIES



4,205

meters of covered walkways within campus

170,000

About participants in arts and culture events

## CU 2040 Masterplan

To prepare for the learning environment of the future, the Physical Resources Management Office of Chulalongkorn University (PRM), together with the Urban Design and Development Center (UddC), have designed and developed the CU 2040 Masterplan, a backbone for development projects within the university.

The plan incorporates a participatory design approach in which multiple stakeholders are involved in the whole design process. It is intended to lay the foundation for Chulalongkorn to become an innovative and sustainable university.

## Picture of participation: Art4C

The Faculty of Fine and Applied Arts, in collaboration with the Property Management Office of Chulalongkorn University (PMCU) and URAI Paints Co Ltd, the maker of ATM Spray, have transformed the Sam Yan-Suan Luang neighborhood, Siam Square shopping area and the Lido Theater into open-air art museums in line with the faculty's desire to revive communities using the arts.

More than 50 artists, including Alex Face and Pod Moderndog, created graffiti and mural paintings on once-neglected walls in the neighborhoods as part of the project known as Art4C or Art for Community.

The photogenic works have gained popularity among Thai and foreign visitors, leading to an indirect boost in the neighborhood economy as well. Moreover, to encourage a more self-sufficient community, the university has trained a number of motorcyclists to give visitors "wall crawl" tours.

## Chula Smart City

The Sam Yan neighborhood adjacent to the Chulalongkorn campus has been chosen as the pilot project site of the Chula Smart City program. The Property Management Office of Chulalongkorn University envisions an innovative neighborhood that offers a balance between quality of life and business. It has set a goal to offer the best quality and most sustainable life under the "SMART 4" concept: Smart Mobility, Smart Energy, Smart Environment and Smart Living. In Thailand Smart City Week 2020, Chulalongkorn University among 13 other areas which received the Certificate on the Promotion of Smart City from the Office of Digital Economy and Promotion Agency (DEPA), the Ministry of Digital Economy and Society.

## Rama IV Model: Big data to solve traffic congestion

Rama IV Road is one of the busiest thoroughfares in Bangkok, with a high concentration of significant economic and residential areas along its 12-kilometer length. It is also connected to other major roads including Silom and Sathorn.

In an attempt to tackle chronic traffic congestion in the area, the Rama IV Model project has emerged from a collaboration among the public and the private sectors and academic institutions, including the Ministry of Transport, the Bangkok Metropolitan Administration, the Bangkok Metropolitan Police

Bureau, GrabTaxi (Thailand), Toyota Mobility Foundation and Chulalongkorn University.

The project aims to combine technology with advanced data from the participating collaborators' databases to analyze and predict traffic patterns on Rama IV Road and eventually provide recommendations to improve traffic conditions. The project is scheduled to be completed in May 2021.

## CU Social Engagement

Since 2017, Chulalongkorn University, through its academic and research units, has engaged with local communities across Thailand. The program aims to support each community to sustainably tackle its own challenges. For example, the university has arranged training and workshops for local residents to create new jobs in and outside of tourism in Koh Sichang, and has helped improve the quality of guidance counselors in schools in Saraburi province by introducing the "Life Planning Journal" to be used by students.

In FY2019, more than 70 local communities in Nan, Saraburi, Koh Sichang (Chon Buri), Bangkok, Samut Sakhon and Nakhon Pathom provinces have benefitted from CU social engagement activities.

## Design for Society: CU D4S

CU D4S or CU Design for Society is a joint initiative of the Faculty of Architecture at Chulalongkorn University and its alumni association with support from the Chulalongkorn University Second Century Fund (C2F). Established as a social enterprise, its mission is to promote architectural design that is functional for public services.

One example of its work is the Zero Covid project, in which health personnel and architects have collaborated to improve health facilities, specifically to prevent airborne infections during the Covid-19 crisis.

CU D4S attempts to tackle social issues through design and design thinking as tools for implementation. It currently is involved in four programs, eight social challenge projects and eight research studios.

## PM2.5 monitoring

High public concern about poor air quality has led to new initiatives to measure pollution, especially PM 2.5 fine dust particles. One such project has been undertaken by the Thailand Network Center on Air Quality Management (TAQM), together with the Chulalongkorn University Research Group of Environmental Management Using Geospatial Information Technology (EnvGIT) and experts from other institutions. To date, the project has installed PM2.5 sensors to measure fine dust particle concentration at more than 120 locations in Nan, Samut Sakhon and Bangkok. The EnvGIT then maps hourly PM2.5 measurements on the CUSense Air Quality Map (<http://www.cusense.net>) for further analytical purposes.



# RESPONSIBLE CONSUMPTION AND PRODUCTION

## การผลิตและการบริโภคอย่างรับผิดชอบ

Ensure sustainable consumption and production patterns

รับรองแผนการบริโภคและการผลิตที่ยั่งยืน

12 RESPONSIBLE CONSUMPTION AND PRODUCTION





## Chula Zero Waste

Waste is a major environmental problem. Chulalongkorn University is determined to contribute to its resolution.

The Environmental Research Institute, Chulalongkorn University (ERIC) and the Office of Physical Resources Management are collaborating to drive the Chula Zero Waste project. Comprising six plans based on sustainable waste management principles, the project is intended to become a waste management model for other communities.

The underlying plans include developing waste management systems, downstream waste reduction, developing and improving waste separation from the consumer side, improving waste collection systems in the university, improving organic waste management, and developing information tools/media on sustainable waste management.

Chula Zero Waste is an umbrella term for numerous smaller projects. Some examples include waste prevention and reduction at its source, My Cup and My Bottle to reduce the use of plastic cups, and Green Office to encourage proper waste separation in university buildings.

This year the resulting reduction of waste amounted to 245.2 tonnes: 141 tonnes through waste reduction and 104.2 tonnes from waste separation. Waste reduction and prevention resulted mainly from reduced food waste, reduced use of plastic bags from stores, and the switch from plastic cups to environmentally friendly varieties.

## Creative Tourism in Nan

Tourism and related services have been the key source of income for Thailand since the 1990s. The sector accounted for 18.4% of gross domestic product (GDP) in 2018. While rapid growth in the number of tourists benefits the economy and employment rates, without proper management it puts heavy pressure on natural resources and the environment. The Chula Creative Tourism project aims to tackle this challenge by utilizing natural and cultural resources in a sustainable manner to maximize the competitive capabilities of Thai tourism.

The pilot project in Nan province comprises a total of eight sub-projects categorized according to their purposes: (a) to improve local goods and services, (b) to incorporate geological knowledge and history elements into tourism, and (c) to support a more connected touristic route network.



## Pig raising with bio-innovation

The use of antibiotics in pig farming has been a growing concern among consumers worldwide, as residual antibiotics in the meat they consume may have adverse effects on people's health.

In response to consumer demand for improved food safety and reduced antibiotic use, Assoc Prof Dr Kris Anakanaporn of the Faculty of Veterinary Science is among those at the forefront of research into natural alternatives to antibiotics. He has teamed up with another veterinarian, Dr Kitti Supchukun, and developed a bio-innovative product called SEDDStrong.

The product works by adapting self-emulsifying drug delivery system (SEDD) technology to encapsulate oregano essential oil, combining it with other natural ingredients to promote efficacy of absorption in pig intestines and convenience of use and transport.

The product was piloted and tested at a farm in Nakhon Pathom province, with close consultation and monitoring by the research team. SEDDStrong has been recognized in several national and international innovation contests and was registered for a patent in 2019.

## Mighty Microbes

Pesticide or herbicide leftovers in soil are an environmental as well as health concern. To deal with the challenge, Chulalongkorn researchers have come up with a risk-free biological solution.

Microbial Pesticide Innovation for Increasing Agricultural Production, Clean Food and Environmental Restoration is a project led by Prof Dr Alisa Vangnai, a biochemistry expert, and the Biological Accelerator and Environmental Biotechnology unit at the Faculty of Science. It introduces "energetic microbes" to interested farmers.

These microbes break down chemical pesticides and herbicides in the soil while accelerating plant growth and productivity. The microbes can be used repeatedly without affecting the quality of the produce. There are also no harmful residues left over, thus no effect on wastewater treatment.





# CLIMATE ACTION

## รับมือกับสภาพภูมิอากาศ

Take urgent action to combat climate change and its impacts

ดำเนินการมาตรการเร่งด่วนเพื่อรับมือกับการเปลี่ยนแปลงสภาพภูมิอากาศและผลกระทบ

13 CLIMATE ACTION



### Research cluster tackles climate change

No other environmental crisis is arguably more urgent than climate change. It's an issue that demands scientific knowledge to understand and resolve. Chulalongkorn University has brought together expertise from its various faculties, such as sciences, engineering, social sciences, economics and other related fields, to study climate change in all its dimensions.

The Climate Change and Disaster Management Cluster is tasked with studying a wide range of topics covering problem solving/adaptation and prevention of climate change as well as disaster management in Thailand. In addition, the cluster promotes academic cooperation through a research network with other universities, the industrial sector, private and public sectors, communities and other related sectors.

The cluster also helps to develop human resources with a proactive mindset in order to effectively manage and support greenhouse gas mitigation efforts and to be fully respected at an international level.

### Environmental Research Institute (ERIC)

The Environmental Research Institute, Chulalongkorn University (ERIC) was established in 1974 in response to the increasing significance and necessity of environmental research for national development, and to promote academic progress at the graduate level.

ERIC conducts research on environment-related problems to provide information for planning related to mitigation and prevention of environmental problems, and on environmental conservation and development for a better environment and quality of life for Thai society.

Over the course of its work, the institute has become aware of the large scale and diversity of environmental problems facing society, and some of the consequences of development that result in danger to human health and living conditions.

### CU scientists explore Arctic Ocean to measure climate change

Chulalongkorn University researchers from the Faculty of Science became the first from Asia to explore the Arctic and study underwater climate change during a research expedition from July 24 to Aug 12, 2018.

Thailand's first polar research was organized by The Information Technology Foundation under the Initiative of Her Royal Highness Princess Maha Chakri Sirindhorn in collaboration with the Embassy of Norway, the National Science Museum and Chulalongkorn University.

The two CU researchers selected to join the team were Assoc Prof Voranop Viyakarn and Assoc Prof Suchana Chavanich from the Department of Marine Science. The main mission of the trip was to investigate how the Arctic Ocean is changing and to measure the effects of climate change. One major concern is that the area has turned into a garbage trap for marine debris from human activities and a place where greenhouse gases accumulate.

Clearly, the Arctic has become Earth's first line of defense, and explorations and observations on any changes happening there are crucial for the planet's future, Assoc Prof Voranop explained.

### Low-carbon city: a trend for the future

The development of low-carbon cities is a crucial, long-term approach to reducing greenhouse gases stemming from activities in rapidly expanding urban areas all around the world.

The Energy Research Institute of Chulalongkorn University has obtained a grant from the Thailand Greenhouse Gas Management Organization to conduct a study to create a knowledge base on low-carbon city management. It will also look at ways local administrations can adapt to impacts of climate change.

The project aims at preparing municipalities for climate change impacts in line with a sustainable development approach. Workshops on low-carbon city management have been held in five major centers — Bangkok, Chiang Mai, Khon Kaen, Nakhon Ratchasima and Koh Samui in Surat Thani — with 100 participants.

### Support for greenhouse gas emission reduction

Assessment of the readiness and efficacy of greenhouse gas (GHG) mitigation technologies is one of the activities of the Climate Change and Disaster Management Cluster at Chulalongkorn University. The result is a knowledge database that helps support a national strategy to meet Thailand's target to reduce GHG emissions by 20-25% from current levels by 2030. Such a database also makes important contributions to the formulation of research policy and the country's broader technological development.

A strong technological base is vital to enable Thailand to meet its national policy targets and international obligations for GHG mitigation as well as to reduce social and environmental impacts of economic activity and create additional value added. The study aimed to assess and analyze the readiness and importance of key GHG emission technologies using multi-criteria analysis (MCA).

### Satellite-based rainfall analysis for flood forecasting

The Hydro-Informatics Institute (HII), together with Chula Unisearch, has developed a joint project called "Application of Satellite-based Rainfall for Operational Flood Forecasting".

The project has three main aims: 1. To analyze the potential and uncertainty of satellite-based rainfall estimates; 2. To perform bias correction of satellite-based rainfall estimates; and 3. To evaluate the performance of HII's flood forecasting system using bias-corrected satellite rainfall data and HII rainfall data from 2008 to 2015 in the Chao Phraya River Basin, northeastern and eastern areas of Thailand.

It is expected that the study will provide an automatic system for a bias-corrected satellite-based rainfall database, which is linked to a rainfall-runoff simulation using the Nedbør-Afstrømnings-Model (NAM).

The outcomes of the study included an algorithm that can be used to adjust the bias of three-hourly satellite-biased rainfall estimates using rain gauges, a telemetry system, as well as rainfall data from radar. As well, the study has produced guidelines for using temperature and humidity to adjust the bias of satellite-based rainfall estimates, and suggestions for local calibration of the algorithms of Global Satellite Mapping of Precipitation (GSMaP) using observations in Thailand.



# LIFE BELOW WATER

## ชีวิตใต้เบื้องสมุทร

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

อนุรักษ์และใช้ประโยชน์จากมหาสมุทรและทรัพยากรทางทะเลเพื่อการพัฒนาอย่างยั่งยืน

14 LIFE  
BELOW WATER



- Chulalongkorn researchers are pioneers in Southeast Asia in culturing corals through sexual reproduction
- With support from Japan, Chulalongkorn has established a center to tackle the serious problem of marine plastic pollution

### Coral reef conservation and restoration

Chulalongkorn University has long been working on coral reef conservation and restoration to help promote the sustainability of ecosystems in Thailand. The university has been a pioneer in Southeast Asia in mass-culturing coral through sexual reproduction. This technique has been chosen as one of the approaches used for coral restoration in Thailand and Southeast Asia.

The university is also recognized as the developer of the world's first coral-reef breeding method that uses the frozen sperm cells of the finger staghorn coral for cultivation. This is a promising technique that could be one of the ultimate solutions to save coral reefs from further deterioration and extinction.

In addition, a pilot project using the legs of a petroleum wellhead to make artificial reefs has been studied, with participation from the Department of Marine and Coastal Resources, to promote the conservation of marine resources in the waters off Koh Phangan in Surat Thani province.

The university has also worked with Siam Cement Group (SCG) Public Co Ltd to develop a prototype of a new generation of artificial corals that are closer to appearing natural, with molding technology using up to 40% recycled concrete waste as a substitute for limestone.

### Management of marine debris and pollution

Chulalongkorn University in collaboration with the government of Japan has established the Center of Excellence for Marine Plastic Pollution Studies in Southeast Asia. The center aims to acquire more research data on marine plastic pollution to help promote sustainable management. It is expected to propose recommendations and action plans for reducing marine plastic waste to the Thai government.

Realizing that success in conservation cannot be sustained without cooperation from the public, the center has also organized activities designed to raise awareness about waste reduction, reuse and recycling among local residents, especially young people. The center has actively sought cooperation from many stakeholders in carrying out projects and activities. An example is "Samae-San Zero Trash", a pilot project launched in Chonburi province.

### Project collaborations

- The Department of Marine Science in the Faculty of Science has been a longtime collaborator with UNESCO-IOC/Westpac, particularly on SDG 14 related to the topics of Coral Conservation, Marine Pollution, Marine Debris Management, and Conservation and Sustainability of Marine Biodiversity.

- Together with other countries in East and Southeast Asia, Chulalongkorn University has a long-term project on Coastal Ecosystems in Southeast Asia. The project focuses on establishing in-depth data for management of marine biodiversity and marine pollution in the Southeast Asian region.





# LIFE ON LAND

## ชีวิตบนพื้นพิภพ

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

ปกป้อง พื้นพิภพ และส่งเสริมการใช้ประโยชน์จากระบบนิเวศทางบกอย่างยั่งยืน

15 LIFE ON LAND



More than **240** new species discovered  
by Chula professors

### Beyond Biodiversity: SDGs Hackathon

The fourth Beyond Biodiversity event, a research and educational program that emerged from collaboration involving Chulalongkorn University, Waseda University of Japan and the AEON Environmental Foundation, was a Hackathon to find how to tackle plastic pollution challenges.

The SDGs Hackathon took place on Feb 3 and 4, 2020 at the library of the Faculty of Architecture at Chulalongkorn University. Each team, consisting of 5 undergraduates from different disciplines and universities and a mentor, brainstormed and produced ideas to cope with plastic waste issues within 24 hours.

### Reviving Nan's forests: Rak Pa Nan

To stem further losses of natural resources from monoculture farming and toxic herbicide and pesticide use, Chulalongkorn University has been carrying out a project to restore forests as well as create jobs and instill environmental awareness among residents in Nan since 2014.

Since 2015, the Chulalongkorn team and associated groups under the Centre of Learning Network for the Region (CNLR) have planted more than 150,000 trees in the northern province. The center will continue to monitor the restoration of the forests and assess the quantity of carbon dioxide being sequestered to serve as a guideline for communities to launch carbon credit programs in the future.

### Discovery of new species

- A team of Chulalongkorn University researchers studying the biodiversity of millipedes has discovered 91 new species and named eight new genera. The team was led by Prof Dr Somsak Panha of the Department of Biology, who is also director of the Center of Excellence on Biodiversity. Thailand is home to the most complete collection of millipede samples, which is available to be used as a database for the study of millipedes in Southeast Asia. Millipedes are beneficial to tropical forest ecosystems for their role in decomposing vegetation and cycling nutrients back into the soil, and are called a “mobile fertilizer factory”.

- A research team from Chulalongkorn University led by Dr Porrawee Pomchote recently discovered a new species of newt in Doi Phu Kha National Park in Nan province. The researchers found about 50 newts on a mountaintop and undertook DNA banding to confirm that they belong to a new species. The presence of the amphibians, named *Tylototriton phukhaensis*, is considered an indicator of the pristine condition of the forest. The eggs, larvae and adults of the species thrive only in undisturbed forest areas.

### Fungi bring forests back to life

Hoping to find new approaches to sustainable reforestation in Thailand, Assistant Prof Dr Jittra Piapukiew of the Department of Botany leads a project known as the Use of Mycorrhizal Fungi to Enhance Reforestation of Native Tree Species in Thailand. The project has received support from The Mushroom Initiative Limited, an environmental non-profit organization from Hong Kong, as well as the Chaipattana Foundation, Kasetsart University, Ubon Ratchathani University and Nakhon Phanom University.

Mycorrhizal fungi not only help improve the survival rates of seedlings after they are replanted, but also help produce various types of edible mushrooms, such as *Astraeus odoratus* and *Amanita hemibapha*. So, instead of practising monoculture farming on formerly forested land, local residents can earn income from collecting and selling the mushrooms if they let their land be reforested. Since 2018, communities in 10 provinces across Thailand have joined the project.





# PEACE, JUSTICE AND STRONG INSTITUTIONS

สงบสุข ยุติธรรม และเป็นสถาบันที่เข้มแข็ง

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

ส่งเสริมสังคมสงบสุข ยุติธรรม ไม่แบ่งแยก เพื่อการพัฒนาอย่างยั่งยืน

16 PEACE, JUSTICE AND STRONG INSTITUTIONS





### Center for Social Development Studies (CSDS)

“Ecological and social justice lies at the heart of a new politics of sustainability in Southeast Asia, in which all life, both human and non-human, is valued and respected,” states a vision statement from the Center for Social Development Studies (CSDS) in the Faculty of Political Science at Chulalongkorn University.

To lay a foundation for that vision, the CSDS conducts interdisciplinary and transdisciplinary research on development policy and practice in Southeast Asia that is innovative, inclusive and sustainable. Some recent research produced by the CSDS includes: “Hybrid Governance of Transboundary Commons: Insights from Southeast Asia”; “Shaping the Future of Mekong Regional Architecture: Reinforcing Transboundary Water Governance Through Reciprocity” (policy brief); “The Water-Food-Energy Nexus: Power, Politics and Justice” (book); “Knowing the Salween River: Resource Politics of a Contested Transboundary River” (book).

### Center for Peace and Conflict Studies (CPCS)

In many areas of the world, peace seems elusive. In the southernmost part of Thailand, armed conflicts have been raging for decades. The Center for Peace and Conflict Studies (CPCS) wishes to play a role in conflict resolution by peaceful means.

Established in 2005, the center’s objectives are: to respond to the urgent need for policies on building harmony in the case of the Deep South of Thailand; to accumulate and develop a body of knowledge as well as experience in conflict resolution by peaceful means from the international domain and Thai society; to organize training programs and develop activities promoting national and international peaceful means; and to develop curriculum and training projects on peace and conflict resolution by peaceful means.

### Student Union Chulalongkorn University

Chulalongkorn University encourages students to actively engage in democratic participation. The Student Union Chulalongkorn University (SUCU) is modeled on the parliamentary system with the executive branch represented by the Student Government of Chulalongkorn University (SGCU), and the legislative branch represented by the Student Council of Chulalongkorn University (SCCU).

Chula students vote directly for the SGCU president as well as nine other executives through an online voting system using a mobile application called CUNEX. The Student Government is responsible for organizing student activities and clubs on campus.

The Student Council is composed of elected representatives from all faculties and Chulalongkorn University residences. The council is responsible for budget control as well as ensuring that activities are organized according to stated objectives.

The Student Union actively looks out for the best interests of the students. When the situation calls for it, the Union acts on behalf of the student body to voice opinions to the Thai government on issues of concern. The Union is non-discriminatory and all-inclusive. In 2019, the Union was led, for the first time, by a female president.

### Thailand Challenge: Toward a non-violent society

Contrary to popular perception, Thailand is far from being a peaceful country. In the Global Peace Index 2019, Thailand was ranked the 47th most violent country out of 163 countries surveyed. The number is worrisome; so are academic contributions on the issue.

Knowledge of best practice and preventive measures in the Thai context is lacking even though the body of research on violence, its causes and its impacts is quite substantial.

In the quest to find practical solutions to this problem, the Department of Sociology and Anthropology, the Faculty of Political Science, Chulalongkorn University, with support from the National Research Council of Thailand (NRCT), initiated the “Thailand Challenge: Toward a non-violent society” project. Researchers from the academic and civic sectors and practitioners jointly produced work on 13 topics, encompassing three levels of violence: self-directed, interpersonal and collective. A seminar on the research findings was held on Feb 27, 2020.

### SDG X LawChula

The Faculty of Law of Chulalongkorn University is dedicated to promoting the United Nations Sustainable Development Goals (SDGs). To contribute to the achievement of those goals, the faculty has initiated a number of programs as follows:

1. The Law Lab for Startups is intended to provide law students with opportunities to gain experience in working with startup companies, where they can study and analyze operations and present their findings from a legal perspective to those companies. Their participation should help strengthen the process of innovation that may lead to sustainable development for the startup sector.
2. Chula Legal Tech is a collaborative effort between the Law Faculty and the law firm Tilleke & Gibbins International to encourage collaboration between law students and their peers from other faculties. Participants learn how to innovate legal tools and services while applying new technology to facilitate access to legal services and enhance legal applications more effectively.
3. The Project to Study the 2004 International Convention for the Control and Management of Ships’ Ballast Water and Sediments is a research program by the Law Faculty to recommend necessary measures to prevent, control and mitigate the impact of marine pollution, reduce risks to human health and living beings’ survival, and encourage people to generate more income.
4. Law Chula Student Outreach and Legal Design Thinking is aimed at encouraging students to study, analyze and brainstorm legal issues relating to communities to come up with recommendations for tackling problems such as homeless or stateless people, and domestic violence.
5. Development of Non-custodial Measures for Legal Offenders is a research project to study non-custodial measures for criminal offenders, aiming at providing better protection for the rights of individuals in the justice process.



# PARTNERSHIPS FOR THE GOALS

หุ้นส่วนความร่วมมือสู่ทุกเป้าหมาย

Strengthen the means of implementation and revitalize  
the global partnership for sustainable development

สร้างพลังแห่งการเป็นหุ้นส่วนความร่วมมือระดับสากลต่อการพัฒนาที่ยั่งยืน

17 PARTNERSHIPS  
FOR THE GOALS



### CU SDGs Platform

Realizing the significant role it can play to drive society toward meeting the Sustainable Development Goals (SDGs), Chulalongkorn University initiated the CU SDGs Platform by organizing brainstorming sessions with over 80 faculties and researchers as well as students. The first forum kicked on July 2, 2020 aimed to mobilize cooperation between Chula scholars and the public to pave the way for a sustainable society.

### CU collaboration with government agencies

As one of the region's leading educational institutes, Chulalongkorn University is well equipped with both advanced knowledge and brilliant researchers in modern innovation that could make worthy contributions for the public interest. In doing so, the university has established numerous projects for the benefit of the public.

One such project involves collaborative research with the Thai Ministry of Public Health to apply artificial intelligence (AI) to read chest x-rays in the diagnosis of tuberculosis. This is the first project of its kind in Thailand.

Another example is the Chula Smart City for P2P Power Trade. The university has signed a memorandum with the Metropolitan Electricity Authority and Energy Absolute Public Company Limited (EA) to create a "Chula Smart City", which will develop an intelligent power management system and stimulate power trading through a peer-to-peer (P2P) platform.

The university also has established connections with national and international sustainable development organizations. They include:

1. International Sustainable Campus Network (ISCN)
2. Asian Sustainable Campus Network (ASCN)
3. Sustainable University Network of Thailand (SUN Thailand)
4. South East Asia Sustainability Network (SEASN)
5. United Nations Environment Programme (UNEP)
6. United Nations Educational, Scientific and Cultural Organization (UNESCO)
7. Stockholm Environment Institute (SEI)

### Sustainability in education at Chulalongkorn University

As climate change worsens, creating a crisis on a global scale, it is crucial that academic institutions provide education that aims to achieve sustainable development to stem the advancing crisis. Chulalongkorn University is doing its part. It has designed over 1,300 courses related to sustainability and sustainable development.

At the undergraduate level, some of the general education courses include "Multidisciplinary Study for Rural Development", "Global Warming Adaptation" and "Industrial Business Management".

Sustainability is not only part of courses but integrated into study programs as well. One recently created program is the Bachelor of Arts and Science in Integrated Innovation (BAScii) from the

Chulalongkorn School of Integrated Innovation, which welcomed its first batch of students in 2019. The program combines science, technology and innovation together with management and design. One of the four available tracks is called Sustainable Development.

For postgraduates, among other notable sustainability related programs, the university offers an Environment, Development and Sustainability (EDS) program, which provides an integrated approach to topics such as sustainable development and the environment. Instead of focusing only on environment and development studies, EDS studies also cover areas such as business and trade strategies for environmental management, energy planning, poverty reduction, natural resource management, green building and urban development, in addition to core climate and ecosystem topics such as climate change, soil degradation, biological diversity and pollution. The EDS program's objective is to broaden the horizons of students to integrate their studies across various sub-disciplines in both the natural and social sciences, so that their results lead to sound public policy and good governance.

### Thailand Talent Mobility Program

To enhance the competitive edge of Thai industry in the global market, the country needs more than state-of-the-art R&D labs, but a pool of talents in science and technology from all resources.

Together with local industry, Chulalongkorn University and 27 other state institutes are backing a program called Talent Mobility. It oversees the transfer of talents from state universities and research institutes to the private sector. Professors and researchers join their peers in private industry to upgrade research and development endeavors and meet global challenges.

This university-industry link has strong potential to help catapult Thailand into the forefront of sustainable development in global innovation.





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