



A wide-angle photograph of the Dalin Tzu Chi Hospital. The hospital is a large, multi-story building with a modern architectural style, featuring a mix of light-colored and grey facades. It is situated on a hill, surrounded by lush green trees and vegetation. In the background, several high-rise apartment buildings are visible against a clear blue sky. The overall scene conveys a sense of a green and healthy environment.

Green Healthcare at Dalin Tzu Chi Hospital



By Huang Hsiao-Chuan

The World Health Organization has declared climate change the “biggest global health threat of the 21st century”. It is expected that a rising number of threats and challenges associated with climate change such as health hazards caused by extreme heat, infectious diseases, and famines will emerge in the future. Healthcare institutions account for around 5% of global carbon emissions. Greenhouse gases generated by healthcare operations also contribute to the worsening of climate issues and the rising frequency of disasters. The “Race To Zero Campaign” launched by the UN aims to curb global warming, reduce the frequency of extreme weather events, and protect the health of our planet. As members of the healthcare system in Taiwan, we cannot afford to turn a blind eye to these issues.

Deep-seated Spirit of Green Energy and Environmental Protection – Power and Water Savings and Carbon Emission Reductions

Since the commencement of Dalin Tzu Chi Hospital in 2000, ongoing efforts have been made to implement environmental protection in different dimensions and encourage staff members to become vegetarians, use eco-friendly tableware, practice water and power conservation, and implement resource recycling. The hospital therefore places equal emphasis on caring for its patients’ and the environment’s health. Over the years, the hospital’s achievements in promoting environmental protection and green hospital concepts have been

Dalin Tzu Chi Hospital features indoor green walls and outdoor sky gardens, which not only reduce direct sunlight exposure but also beautify the environment. These features also represent a contribution to protecting the natural ecology.

recognized with numerous awards in Taiwan and abroad. Dalin Tzu Chi Hospital is also the first hospital in Asia and Taiwan to participate in the “2050 Net Zero Emissions” campaign launched by the UN to make a valid contribution to protecting our planet and our health.

During the construction of the hospital, green building design concepts were adopted including indoor green walls, sky gardens, and potted plants in corridors to beautify the environment and reduce direct sunlight exposure with the goal of saving energy. As far as lighting is concerned, natural ventilation and lighting and solar street lamps have been utilized for the building design. In addition, traditional lighting is gradually replaced with LED light fixtures and motion sensitive lighting has been installed in public areas. The electric power system of the hospital

is controlled by a smart energy monitoring system. Annual review and analysis are carried out at the end of each year with the aid of an energy management system and scenario simulation tools to determine directions for improvement. In recent years, the central monitoring system which controls water, power, and AC use has been successively updated. In addition, air conditioning units have been



equipped with inverter systems and AMB (Active Magnetic Bearing) chiller units have been purchased.

A reclaimed water recycling system was installed prior to the opening of the hospital. Motion-sensitive, automatic turn-off faucets which have been installed in public areas reduce faucet water use by around 50%. The outdoor area of the hospital which is paved with water-permeable pavers features an eco-pond and a cistern attached to the Da-Ai Farm.

The hospital offers free shuttle bus services to its patients to encourage them to use public transportation. Furthermore, resource recycling bins for nine different waste categories are available at each nursing station to facilitate the sorting

of different recyclable materials. With a view to promoting vegetarian diets with a low carbon footprint, all cafeterias and convenience stores in the hospital area exclusively serve and sell vegetarian meals and vegetarian food products. The ultimate goal is to turn environmental protection into part of the daily routine.

In addition to implementing energy conservation and carbon reduction through the installation of various hard- and software facilities, the hospital organizes different types of activities to encourage all staff members to adopt green living practices. In line with the plastic reduction policy of the Taiwanese government, Dalin Tzu Chi Hospital invited representatives of its subcontractors to



On March 18, 2019, Dalin Tzu Chi Hospital invited representatives of its subcontractors to issue a joint declaration with the hospital supervisors in support of the plastic straw ban initiative in hospitals to demonstrate its commitment to no longer offer plastic straws in the hospital and thereby fulfill its social responsibility to care for our earth.



Members of the Dalin Tzu Chi Hospital Engineering Department replace traditional fluorescent tubes with energy-saving LED tubes.

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With a view to motivating its staff members to implement energy conservation and carbon reduction through concrete action, the hospital has organized the “Dalin Tzu Chi Green Forest” activity for three consecutive years. The duration of the activity has been lengthened successively from 21 days in the first year to 30 days in the second year and 90 days in 2023 to echo the spirit of “green living” for three consecutive months. Staff members are encouraged to join the LINE@ life sphere group titled “2023 Dalin Tzu Chi Green Forest” and practice green lifestyles for three consecutive months. The activity



Members of the General Affairs Office of Dalin Tzu Chi Hospital conduct environmental protection training in all hospital units to enhance the recycling mechanism for biomedical and general items.

involves a wide range of green actions such as weekly statistics of achievements in turning off lights and computers when not in use, no elevator days, reduced personal vehicle use, cherishing of food, healthy vegetarian meals, water conservation, use of cloud-based invoice APP, banning of disposable tableware and bottled water, repeated use of plastic bags, and use of 100% recycled toilet paper and designated Green Mark-certified products. The goal is to foster eco-friendly lifestyles and make joint contributions to energy conservation and carbon reduction. Estimated carbon footprint savings of the 30-day activity in 2022 amounted to 29,874 kg. It has been determined that if the aforementioned green actions were implemented over the whole year, carbon savings would add up to 363,467 kg, which is equivalent to the

total CO₂ adsorption capacity of 29,989 trees.

Mr. Hou Chun-Yen, Director of the General Affairs Office points out that “our actions can help reduce global carbon emissions. Turning off lights and computers when not in use and taking the stairs instead of the elevator is not only conducive to energy conservation but also to personal fitness. We have to remember that the reduction of environmental pollution and waste burdening our ecosystems is the responsibility of every citizen of the world.”

Taking the Initiative in Aligning with International Standards – Health Promotion Through Green Hospital Concepts

In addition to its determined efforts in the field of hard- and software installations and concrete actions, Dalin Tzu Chi Hospital has put out feelers to every corner of the world. Through cooperation with international organizations, the hospital gains the ability to expand its horizon and share its achievements.

Dalin Tzu Chi Hospital actively participates in the international HPH



Dalin Tzu Chi Hospital has organized campaigns on occasion of Earth Day for several consecutive years. Staff members were invited to join the LINE@ life sphere group titled “2023 Dalin Tzu Chi Green Forest” and practice green lifestyles for three consecutive months.



Dalin Tzu Chi Hospital actively responds to various energy-saving and carbon-reducing measures facilities, such as updating the magnetic levitation ice water machine to improve air conditioning efficiency.

(Health-promoting Hospital) network. Since the first dispatch of a delegation to participate in the 15th annual HPH conference held in Vienna in 2007, a total of 77 hospital staff members have attended such conferences over 13 consecutive years. In the context of these conferences, hospital employees have presented 50 papers in oral format and 49 papers in poster format. They also gave two keynote speeches.

The Taskforce of HPH & Environment of the International HPH Hospital Network was established in 2010, convened for its first meeting in Manchester, UK. Dalin Tzu Chi Hospital assisted in the planning of this meeting. Dr. Lin Chin-Lon, CEO of Buddhist Tzu Chi Medical Foundation, took over as Chairman of the Taskforce in 2014. Vice Superintendent Lin Ming-Nan succeeded him as Chairman in 2018 to continue the mission of promoting green hospital concepts.

Bronze Award in the Hospital Category of the National Biotechnology and Medical Care Quality Awards

Dalin Tzu Chi Hospital's unwavering commitment to promoting green hospital concepts is reflected in the adoption of nine environmental indicators, which is unprecedented in Taiwan. As a result of its annual carbon savings in excess of 1,470 tons and various health promoting hospital programs, Dalian Tzu Chi Hospital became the first hospital worldwide to be honored with the Model Award for Outstanding Fulfillment of WHO HPH Standards. Its efforts in this area were further recognized with a Bronze Award in the Medical Administration Section, Hospital Category of the National Biotechnology and Medical Care Quality Awards in 2022.

Bronze Award at the 45th IHF (International Hospital Federation) Excellence Awards for Green Hospitals

Dalín Tzu Chi Hospital has achieved brilliant results in the field of health promotion and green hospitals. The hospital currently partners with seven major international organizations in its efforts and contributions to global sustainability. Over the years, it has also participated and earned countless awards in numerous competitions and exchange

activities held in Taiwan and abroad.

Severe climate change and the realization that natural resources are depletable have resulted in a rising sustainability awareness and the formulation of 17 Sustainable Development Goals (SDGs) by the United Nations in 2015. Dr. Lin Ming-Nan, Vice Superintendent of Dalín Tzu Chi Hospital, who is in charge of the overall planning and promotion of sustainable development, points out that in addition to the ongoing provision of compound screening, joint evaluation services for pre-



The hospital frequently organizes health-, environmental protection-, and energy conservation-related activities to provide staff members with opportunities to form good habits of green action.

school children, and healthcare services in remote townships in response to the rapid population aging in such areas, the hospital has been actively committed to the promotion of environmental protection since its inception. This unwavering commitment is reflected in the signing of the UN “2050 Race to Zero” commitment in 2021.

In November 2022, Vice Superintendent Lin represented Dalin Tzu Chi Hospital at the 45th World Hospital Congress held in Dubai. At this event, the program titled “Race to Zero by

2050, Climate Action of the Hospital—from Patients, People to Planet, which aims to encourage staff members to take green actions such as cherishing water resources, turning off lights when not in use, taking the stairs instead of the elevator, and using eco-friendly tableware to achieve carbon reduction goals, was recognized with the Bronze Award of the IHF Excellence Awards for Green Hospitals. Dalin Tzu Chi Hospital is the first medical institution in Taiwan to earn such an award.

The World Hospital Congress, which





is organized by the International Hospital Federation (IHF), dates back to 1929. The 45th edition of the congress was held under the theme of "Global Learnings, Local Actions: Sustainable Healthcare".

IHF is an international, non-profit, and non-governmental membership organization. It serves as a platform for

knowledge and strategy exchanges and networking with hospitals and healthcare institutions all over the world. It also provides opportunities for international cooperation. In addition to its steadfast commitment to improving the quality of healthcare service delivery and promoting patient safety and workplace health,

First hospital in Taiwan to adopt nine environmental indicators:

1. **EUI (Energy Use Intensity):** The EUI value of 159.2 kwh/M² in 2021 was lower than all its peer hospitals in the same year.
Energy intensity = Annual power consumption in kWh/floor area
The upper limit for regional teaching hospitals and medical centers is 200.3kwh/M² and 239.8kwh/M², respectively.
2. **Water:** The hospital's water consumption is lower than all its peer hospitals (daily water consumption per bed was 0.58 m³) .
The standard set by the Water Resources Agency of the Ministry of Economic Affairs is 0.69 m³ and 0.96 m³ per bed/day for regional hospitals and medical centers, respectively.
3. **Vegetarianism:** Vegetarian meals are available in all hospital areas
4. **Commuting:** Around 60% of all staff members stay in the hospital dorm, which ensures a low transportation carbon footprint.
5. **Guideline formulation:** Assistance to the Health Promotion Administration in the formulation of Standard 8 (Climate Action) of the Healthy Hospital Accreditation
6. **International model awards:** Model Award for Outstanding Fulfillment of WHO HPH Standards in 2012 (first hospital worldwide to earn this award) and International Environment-Friendly Hospital Team Work Best Practice Award in 2013
7. **Main author of the Climate Change and Health Chapter of a textbook of Taiwan Association of Family Medicine** (first time climate change issues have been included in a textbook of a medical society)
8. **Assistance in the planning of the first meeting of the Taskforce of HPH & Environment**, which was established by the Health Promotion Administration in 2010 (location: Manchester, UK), organization of annual discussion forums at International HPH Conferences, and publication of green hospital manuals
9. **First hospital in Asia and Taiwan to join the UN Net-Zero Initiative**



Dalin Tzu Chi Hospital is honored with a Bronze Award at the National Biotechnology and Medical Care Quality Award Ceremony. Superintendent Lai Ning-Sheng (center) and Vice Superintendent Lin Ming-Nan (right) accept the award from Vice President William Lai on behalf of the hospital on February 14, 2023.

it has placed rising emphasis on the sustainability of healthcare systems in recent years. The goal is to demonstrate the determination of the healthcare sector to make a valid contribution to mitigate the worsening of the climate crisis.

Immediate adoption of medical waste reduction actions and implementation from top to bottom

With the active support of Superintendent Lai Ning-Sheng, Vice Superintendent Lin Ming-Nan is not only deeply devoted to promoting the health-

promoting hospital concept in Taiwan but also to disseminating Taiwanese experiences in other countries. Shortly after his return from the US where he attended the CleanMed conference in May, he traveled to Hamburg, Germany to participate in the HPH Governance Board Meeting in mid-June.

Superintendent Lin stresses that the healthcare sector is responsible for around 5% of global carbon emissions. In the US, the healthcare industry accounts for an even higher share of 8%, while the Taiwanese healthcare sector constitutes only 4.4% of domestic emissions.



Greenhouse gases generated by healthcare operations also contribute to the worsening of the climate crisis and the increasing frequency of disasters. These gases affect human health in different ways, resulting in a bigger demand for healthcare services, which in turn leads to more GHG emissions and waste and the formation of a vicious cycle.

In 2007, the Taiwan Society of Health Promoting Hospitals was established, and a “healthy hospital” accreditation system was adopted. In line with international trends and developments, “Climate Action” was added as a new standard to the original seven standards. The later revised “Hospital Climate Action” provision stipulates the formulation of an emergency disaster response plan and relevant operating procedures to meet the needs and requirements of climate change risk and crisis management by hospitals coupled with the implementation of drills. Vice Superintendent Lin further points out that the Taiwanese healthcare sector continues to cooperate with Health Care Without Harm (HCWH) and Global Green and Healthy Hospitals (GGHH).

Vice Superintendent Lin believes that the relative lack of concern on the part of senior management members of a significant number of hospitals despite the promotion of environmental protection over many years represents the biggest challenge. As a result of the neglect of the government to adopt policies and

International Awards & Recognitions

2012

Model Award for Outstanding Fulfillment of WHO HPH Standards (first hospital worldwide to earn this award)

2013

International Environment-Friendly Hospital Team Work Best Practice Award



2015

Health Care Climate Challenge Award – Climate Leadership Gold Award and Climate Resilience Silver Award

2020

Health Care Climate Challenge Award - Climate Leadership Gold Award and Climate Resilience Gold Award

2022

Bronze Award at the 45th IHF (International Hospital Federation) Excellence Awards for Green Hospitals

2023

2nd Asia-Pacific Sustainable Action Awards – Health and Well-Being Award(Presented on July 21 2023)

standards early on to deal with this issue, medical practitioners in Taiwan have failed to prioritize this issue in their busy schedules. However, in the wake of the inclusion of hospital climate actions in government policies, many hospital managers are starting to pay attention to the issue.

Vice Superintendent Lin cites the example of an event that took place several years ago. He was invited to share in a series of seminars held in Taipei, Taichung, and Yunlin how to promote green hospital concepts in local hospitals. Most participating trainees were not hospital supervisors, but rather engineering and general affairs unit personnel put in charge of this task. He therefore realized that these seminars were not very helpful for the promotion of such concepts in hospitals. He further remarks that top-down authorization has facilitated promotion efforts in the last two years.

Taiwan Institute for Sustainable Energy Research (TAISE), which is chaired by Ambassador Eugene Chien, paid relatively little attention to health issues in the past. In recent years, the institute has come to understand the importance of implementing environmental protection in hospitals. After attending the UN Climate Summit last year, former summit participants from all walks of life were invited to share their experiences. While such activities were not very popular in the past, the event in 2022 drew over 300 participants, which is a clear indicator for the rising importance attached to this issue in Taiwan. For instance, 25 hospitals eagerly registered for the nationwide “Climate Impact & GHG Inventory Tool Workshop”, which was held in April 2023 and had a limit of 40 participants.

Dalin Tzu Chi Hospital currently conducts ongoing inventories in the context of ISO 50001 and ISO 14064 certification audits to detect

Dalin Tzu Chi Hospital participates in the following 7 international organizations:

- 1. Health Care Without Harm, HCWH**
- 2. Global Green and Healthy Hospital, GGHH**
- 3. Conference of the Parties, COP**
- 4. CMUSA: CleanMed USA, CleanMed**
- 5. CMEU: Clean Europe, CleanMed**
- 6. UNEP**
- 7. Sustainability Health and Education (SHE) Foundation**



insufficiencies. Noteworthy improvements include the replacement of AC units and lighting fixtures in the hospital area, enhanced elevator design, and upgrades of main energy-consuming equipment. The ultimate goal is to reduce energy consumption and boost energy efficiency.

Zero Emissions is not a dream – inventories of healthcare-related GHG emissions

Buddhist Tzu Chi Medical Foundation, Chiayi Dalin Tzu Chi Hospital, Health Care Without Harm (HCWH), Global Green and Healthy Hospitals (GGHH), and Taiwan Society of Health Promoting Hospitals jointly organized the first “Climate Impact & GHG Inventory Tool Workshop” in Taiwan at Tzu Chi Jing Si Hall in Xindian from April 11 to 12, 2023. On April 13th, they also hosted the first-ever Asian “Race to Zero” summit in Taiwan.

This workshop drew participants from 25 Taiwanese hospitals who wished to learn more about GHG inventories. It also featured 16 experts from the US, Vietnam, Indonesia, the Philippines, Malaysia, and the UK, who shared their professional experiences. This workshop aimed to raise the climate change and health competence of participants by familiarizing them with the climate inventory tool and by scheduling actual drills. They also

learned how to apply this tool to their zero emission tasks and thereby aid their joint efforts to protect global health.

Health Care Without Harm (HCWH) is an international NGO, which appeals to healthcare institutions worldwide to promote environmental sustainability and GHG emission reductions. In the face of the severe challenges posed by global climate change, the healthcare system has a moral obligation not only to safeguard public health but also to make valid contributions to mitigating carbon emissions realizing sustainable development. HCWH is also an official partner of the UN Race to Zero campaign which strives to enlist 11,500 hospitals worldwide by 2050. The Tzu Chi Medical Mission is deeply committed to safeguarding lives and health with love and compassion and upholding the spirit of Tzu Chi environmental protection. Against the backdrop of long-term efforts to promote green hospital concepts, Taiwan Society of Health Promoting Hospitals guides its member hospitals on the path toward becoming sustainable, eco-friendly healthcare institutions.

Ramon San Pascual, Executive Director of Health Care Without Harm, Southeast Asia shares that the main purpose of inventories is to gain a clear understanding of the origin and quantity of an institution’s GHG emissions which greatly facilitates the formulation of action



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plans and guidelines in the future. WHO and HCWH have jointly developed a GHG inventory tool and online reporting platform that suits the needs and requirements of healthcare institutions. The goal is to enable institutions to conduct inventories of greenhouse gases caused by different types of business activities.

Vice Superintendent states that organizations place increasing emphasis on carbon inventories. With a view to promoting net zero emission strategies

among healthcare institutions, HCWH has organized numerous online seminars. In the wake of the gradual lifting of COVID restrictions, the organization held its first workshop in Taiwan to help local hospitals get aligned with domestic and international trends.

On the day after the workshop (afternoon of April 13), experts from different countries and representatives of Taiwanese hospitals assembled at the Tzu-Chi Jing Si Hall in Xindian to attend

the “Race to Zero” summit. The summit served as a forum for exchanges and learning in the fields of resource inventories associated with the promotion of net-zero and carbon reduction strategies in hospitals, formulation of action plans, and ways for hospitals to implement relevant plans and programs.

Global commitment sparks hope for the realization of zero-net emissions in the healthcare sector

It is imperative to combine inventories and carbon emission reductions with different ways to increase carbon sinks. The term “carbon sink” refers to anything that absorbs or stores carbon dioxide. Since forest carbon sinks represent the primary method, forestation is one of the best strategies.

In addition, green energy considerations were fully integrated into the design of the new hospital building. Hardware facilities and means of transportation were also added. With a view to replacing gasoline-powered with electric vehicles, the hospital subsidizes EV purchases by its staff members. All these positive actions are directly or indirectly conducive to green healthcare.

Vice Superintendent Lin states earnestly: “Despite the fact that 2050 is still over two decades away and many of us will no longer be around by then, we



In the afternoon of April 14, 2023, thirteen members of NGOs from six different companies in Europe and Asia lauded resource recycling bins for over nine different waste categories placed in wards and nursing stations and the aquaponics system in the Geriatric Psychiatric Day Care Center attached to the Residential Long-term Care Center as paragons of green healthcare.

have to make arrangements for the next generation. Although the goal of net-zero emissions seems difficult to achieve, there is a chance for success since the whole world is committed to realizing this goal. The development of new technologies is bound to continue. For instance, the efficiency of solar panels and power use will continue to increase. Improvements

in the field of pharmaceuticals that contribute to the GHG effect will also be implemented. Since pharmaceutical manufacturers all over the world consider this a key task, we should not think it is impossible.” He further stresses that “It is possible to achieve net-zero emissions if we keep believing and don’t give up. We cannot relent in our efforts to preserve a livable environment for the next generation. Net-zero emissions may not be viewed as a high-priority issue in the healthcare industry. Our mission is to ensure that everyone attaches great importance to this issue.”

Vice Superintendent Lin quotes the following statement of the WHO: “Climate change is the biggest health threat in the 21st century. Humanity continues to

encroach on wildlife habitats, which will result in a surge of zoonotic diseases. COVID-19, which has transformed the world in recent years, is a notable example. We are bound to face many more threats in the future. If we fail to address and tackle this issue, we will have to deal with a rising number of threats and challenges in the future. This is our role and duty as healthcare professionals.”

Net-zero emission is not a dream! We call upon all colleagues to fulfill their responsibility as citizens of the world by placing simultaneous emphasis on caring for patients and the health of our planet. The ultimate goal is to transform healthcare institutions all over the world from polluters into protectors of the environment.



On April 14, 2023, 13 members of relevant non-profit organizations from six European and Asian countries visited Dalin Tzu Chi Hospital. They saw nine types of resource recycling bins at the ward nursing station and affirmed the implementation of recycling classification.