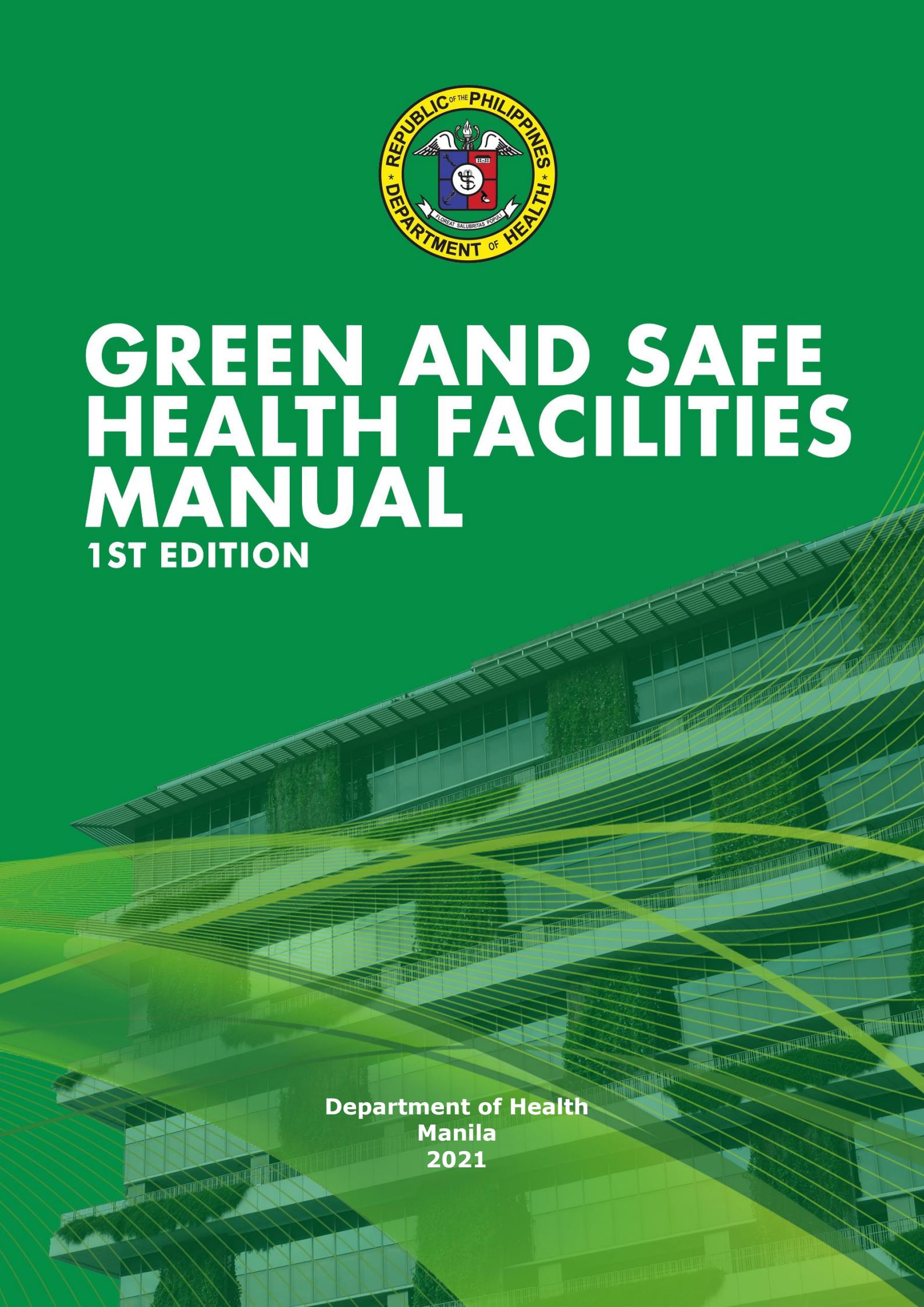
GREEN AND SAFE HEALTH FACILITIES MANUAL

1ST EDITION



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Republic of the Philippines
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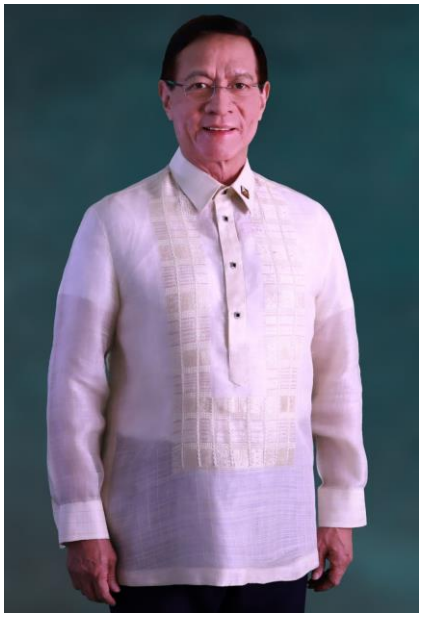
MESSAGE



The Philippines is steadily progressing towards its vision of the Filipino people being ranked among Southeast Asia's healthiest in 2022 and in Asia in 2040. As the technical authority in Philippine public health, the Department of Health (DOH) provides the direction of all partners in boosting the development of a productive, resilient, equitable, and people-centered health system, as codified by RA 1123, the Universal Health Care (UHC) Act, and as directed by the flagship the FOURmula One Plus for Health.

The essence of UHC is a more responsive health system, coupled with more equitable health care financing mechanisms, to provide all Filipinos with high-quality, affordable health products, devices, facilities, and services. As ministers of health, it is our duty to ensure a holistic approach to effect better health outcomes, fulfilling even our obligations to the environment, in recognition of the role that a healthy environment plays on the health and welfare of individuals, families, and communities. With this, our commitment to develop and improve health care facilities, notably in the areas of resource efficiency, increased resilience, and reduced environmental impact, should remain active and dynamic.

It is in this light that I commend the Health Facility Development Bureau (HFDB), the World Health Organization (WHO), and all stakeholders who have collaborated to formulate the Green and Safe Health Facilities Manual. The crafting and development of this Manual is a testament to the intensifying response to the challenges brought about by climate change around the world. The expansive impact of climate change calls on comprehensive paradigm shifts to holistically frame quality health care delivery within climate action, while ensuring that these shifts remain aligned with the National Climate Action Plan, and to our international commitments to human health and environment sustainability.

It is my fervent hope that the effort exhausted in the creation of this manual will effect positive changes for the realisation of a healthier nation. Together, let us create more responsive, more sustainable, and more equitable health systems and communities, one that the future generations can enjoy and rely on.

FRANCISCO T. DUQUE III, MD, MSc
Secretary of Health

Republic of the Philippines
Department of Health
OFFICE OF THE SECRETARY

FOREWORD

The Department of Health's stewardship of the health sector's response to climate change is part of the country's journey in achieving universal health care. Through the resolution adopted at the 61st World Health Assembly, member-states, including the Philippines, were urged to develop health measures and integrate them into plans for adaptation to climate change. Thus, as part of our full commitment to realizing the mandates of Republic Act No. 11223, or the Universal Health Care Act, the Health Facility and Infrastructure Development Team (HFIDT) upholds the initiatives of the Green and Safe Health Care Facility Program of the DOH for the country's support and solidarity to Climate Change and Health.

The Green and Safe Health Facilities Manual was developed as part of the country's response to the global call to address and adapt to the impacts of climate change, and to minimize the carbon footprint of the health sector while continuing to provide quality health and safety to the people. The Manual sets the minimum green and safe standards for all hospitals and other health facilities. The guidelines that comprise the Manual contribute to the attainment of the country's goals towards sustainable development, climate action and Universal Health Care.

The HFIDT and the Health Facility Development Bureau (HFDB) intend to create a positive impact to sustainable development and human survival through initiatives on green and safe health facility development. To guide the country's health facilities in realizing this model, additionally, HFIDT and HFDB launched the Philippine Health Facility Development Plan 2020-2040, which serves as the macro plan to provide policy direction and technical support in health service planning.

In adapting to this Manual's provisions, as well as in aligning to the PHFDP, hospital buildings and operations shall be made more resilient to mitigate the impacts on the environment and to reduce pollution. Green and safe health facility interventions shall develop climate smart hospitals that reduce greenhouse gas emissions, achieve risk reduction in health services and operations, and are cost-efficient.

LILIBETH C. DAVID, MD, MPH, MPM, CESO I
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PREFACE

The Health Facility Development Bureau (HFDB) of the Department of Health is committed towards the continuous development of quality health facilities that are efficient and responsive to the needs of the Filipinos, in fulfillment of the mandate of the Universal Health Care Act.

Towards this end, the HFDB introduces green building as a systematic practice to improve access to care and resource management efficiency. Through the integration of environmental requirements into the facility design processes, we can mitigate adverse human health outcomes and enhance facility resilience.

The Green and Safe Health Facilities Manual details environmental considerations for all health facilities. The standards and criteria in this manual are aimed at enhancing patient safety through improved indoor environmental quality, site sustainability, health care waste management, energy and water efficiency in all facilities.

We created this manual with the technical assistance from the country office of the World Health Organization, participating resource persons and other key advisers. Through this joint effort, timely changes and recognized standard practices in safety, health and environmental management were incorporated.

With the implementation of the standards in this manual, we can reduce the impact of disasters and climate change on the Filipino people. We hope that this manual can reinvigorate the health facility infrastructure in the Philippines.

MA. THERESA G. VERA, MD, MSc, MHA, CESO III
Director IV
Health Facility Development Burea

LIST OF ACRONYMS

ACU	Air Conditioning Units
AHU	Air-handling Units
AMR	Antimicrobial Resistance
AO	Administrative Order
BARMM	Bangsamoro Autonomous Region of Muslim Mindanao
BRI	Building Related Illness
CCC	Climate Change Commission
CCO	Chemical Control Order
CFL	Compact Fluorescent Lamp
CSE	Common Supplies and Equipment
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DOH	Department of Health
DPWH	Department of Public Works and Highways
DR	Delivery Rooms
ECP	Energy Conservation Program
EELs	Energy Efficient Lighting/Lighting System
EFMD	Engineering and Facilities Management Department
EOC	Emergency Operations Center
ER	Emergency Department
FCTC	Framework Convention on Tobacco Control
GB Code	Green Building Code
GEMP	Government Energy Management Program's
GHGs	Green House Gases

GPP	Green Public Procurement
GPPB	Government Procurement Policy Board
HFs	Health Facilities
HCWM	Healthcare Waste Management
HEMB	Health Emergency Management Bureau
HEMS	Health Emergency Staff
HEPA	Health Efficiency Particulate Air
HFEP	Health Facility Enhancement Program
HVAC	Heating, Ventilation and Air-condition
IEQ	Indoor Environmental Quality
LGU	Local Government Unit
NBC	National Building Code
OPD	Out Patient Department
OR	Operating Room
OSA	Outside Supply Air
PD	Presidential Decree
PhATSS	Philippines Approach to Sustainable Sanitation
PMS	Preventive Maintenance Schedule
PNS	Philippine National Standards
PPE	Personal Protective Equipment
PV	Photovoltaic
RA	Republic Act
SDG	Sustainable Development Goals
SHGC	Solar Heat Grain Coefficient

Sqm	Square meter
SRI	Solar Reflectance Index
STC	Sound Transmission Class
STP	Sewerage Treatment Plant
TGFA	Total Gross Floor Areas
VLT	Visible Light Transmittance
VOC	Volatile Organic Compounds
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WWR	Window to Wall Ratio
WWTP	Waste Water Treatment Plan

Definition of Terms

Green & Safe Health Facilities Manual

Government/Government-owned Health Facility

- Ownership of health facility created by law. A government facility may be under the National Government, DOH, Local Government Unit (LGU), Department of National Defense (DND), Philippine National Police (PNP), Department of Justice, State Universities and Colleges (SUCs), Government Owned and Controlled Corporations (GOCC) and others.[1]

Green and Safe

- or Climate Smart. a paradigm shift, away from traditional disaster response to one that proactively seeks to minimize the health impact of disasters and emergencies through climate adaptation and mitigation measures (including climate-proofing and reduction of the environmental footprint), and preparedness

Green Building

- Practice of adopting measures that promote resource management efficiency and site sustainability while minimizing the negative impact of the buildings on human health and the environment

Green Building in Health

- Initiatives of health care provider institutions to establish and sustain their respective green building practices as stewards of human health and environment

Green Hospital

- promote the greening of hospitals and health facilities, including the improvement of energy and water efficiency and conservation, sustainable cooling systems, and sustainable healthcare waste management in hospitals.

Health Facility

- Health care provider which may be public or private, devoted primarily to provision of services for health promotion, prevention, diagnosis, treatment, rehabilitation and palliation of individuals suffering from illness, disease, injury, disability, or deformity, or in need of obstetrical or other medical and nursing care[2]
- An institution that has health care as its core service, function or business. Health care pertains to the maintenance or improvement of the health of individuals or populations through the prevention, diagnosis, treatment, rehabilitation and chronic management of disease, illness, injury and other physical and mental ailments or impairments of human beings.[3]

Private Health Facility

[1] DOH Administrative Order 2012-0012, Rules and Regulations Governing the New Classification of Hospitals and Other Health Facilities in the Philippines

[2] Sec. 4.k.1 of Republic Act 11223, Universal Health Care Act

[3] DOH Administrative Order 2019-0060, Guidelines on the Implementation of the National Health Facility Registry

- A health facility owned, established and operated with funds through donation, principal, investment or other means by an individual, corporation, organization. A private health facility may be a single proprietorship partnership, corporation, cooperative, foundation, religious, non-government organization and others.[4]

Safe

- Resilience. For hospitals as “last buildings standing,” and “build back better, stronger”

[4] DOH Administrative Order 2012-0012, Rules and Regulations Governing the New Classification of Hospitals and Other Health Facilities in the Philippines

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Chapter 1

General Provisions

Green & Safe Health Facilities Manual

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7.0	**Implementation Requirements of the Manual**

Section 1.0 Title

This document shall be known as the Green and Safe Health Facilities Manual, to be hereinafter referred to as the *Green Manual*.

Section 2.0 Policies

2.1 The State shall adopt an integrated and comprehensive approach to health development[5]. The provision of Presidential Decree No. 1096 and its Implementing Rules and Regulation shall be set as the minimum requirements for all construction, alterations, additions, conversions, and renovations of all health facilities (HFs). Hospitals and other health facilities shall be mandated by the Philippine Green Building Code[6] (GB Code) while meeting the prescribed functional programs and conforming to applicable codes as part of the normal professional practice.

2.2 Pursuant to sec. 8.1 of GB Code shall only apply to all new construction and/or with alteration of buildings in the following classification which fall over the benchmark of the required total gross floor area (TGFA) for institutional Building, such that those hospitals and other institutional buildings with at least 10,000 square meters of TGFA as defined by National Building Code (NBC).Therefore, the provisions of the compliance to the provisions of PGBC of HFs that does not meet the benchmark aforementioned is voluntary.

2.2 Contributing to the Nationally Determined Contributions and National Climate Change Action Plan of the Philippines, the Department of Health (DOH) shall undertake green and safe design principles and practices, ensuring that hospitals and other health facilities (HFs) develop policies and programs that mitigate carbon emissions and adapt to extreme weather events and other natural disasters gearing towards climate smart health care delivery system.

Section 3.0 Objective

The Green Manual is developed to respond to the global call of minimizing the carbon footprint of the health sector while continuing to provide quality health and safety to the people, thereby setting the minimum green and safe standards for all hospitals and other HFs.

Section 4.0 Principles

4.1 Medical directors, technical professionals, developers, contractors, health care and hospital administrators involved in the planning, design, construction, administration and management of hospitals and other HFs shall have the responsibility to help the government in addressing the adverse effects of climate

[5] Art. XIII, Sec. 11, Philippine Constitution

[6] Philippine Green Building Code (A Referral Code of the National Building Code, Presidential Decree 1096), issued on the 22nd day of June 2015 by DPWH Secretary Rogelio Singson. Also known as the GB Code.

change while ensuring the health and safety of the people.

4.2 Through the efficient use of resources and sustainable development, the DOH ensures the equitable use of HFs for the present and future generations. Occupants, clients, patients and health care professionals of green and safe HFs shall benefit from the improved indoor and outdoor environmental quality of these facilities. This improved quality promotes higher productivity and safety, and better comfort and healing.

4.3 This Green Manual comprises efforts that contribute to the attainment of the country's goals towards sustainable development, climate action and universal health care. It shall provide information to guide HFs on specific adjustments, repair, retrofitting and other enhancements needed to comply with the green and safe (climate smart) requirements.

4.4 Green and safe HF development shall adhere to the process of gender mainstreaming in government as provided in relevant laws, policies, standards, guidelines, and other national and international instruments. It shall ensure gender analysis at the identification and design stages of projects, using for the purpose, the Harmonized Gender and Development (GAD) Guidelines for Project Development, Implementation, Monitoring and Evaluation[7]. Green and safe HF initiatives may be included by implementers in their GAD targets, provided that these conform to the Gender Mainstreaming in the Development Planning Process.

4.5 As the country's long-term vision and medium-term road map are cognizant of diversity and inclusiveness, implementers of green and safe HFs may also use the climate lens of other protected categories of persons (workers and client stakeholders alike) in the analysis and design of their initiatives.

4.6 This Green Manual shall be consistent with the existing and/or current international and national initiatives and developments as listed below.

Global Initiatives and Developments

- World Health Assembly Resolution on Universal Health Care (2019)[8]
- World Health Assembly Resolution on WASH in Health Care Facilities (2019)[9]
- World Health Resolution on Climate Change and Health (2008)[10]
- WHO Framework Convention on Tobacco Control (2003)[11]
- UN Resolution on Sustainable Development Goals (2015)[12]
- Gender Equality in the 2030 Agenda for Sustainable Development (2015)[13]
- The Geneva Pledge on Climate Change Action (2015)[14]

[7] http://w3.neda.gov.ph/hgdg/homepage.html
[8] https://sdg.iisd.org/news/world-health-assembly-adopts-resolutions-on-universal-health-coverage/
[9] 72nd WHA WASH in HF, Agenda item 12.5, 28 May 2019
[10] https://www.who.int/globalchange/mediacentre/events/wha66/en/
[11] https://www.who.int/fctc/text_download/en/
[12] https://sustainabledevelopment.un.org/?menu=1300
[13] https://www.oecd.org/dac/gender-development/gender-post-2015.htm
[14] https://climaterights.org/our-work/unfccc/geneva-pledge/

- Universal Declaration of Human Rights[15]
- Global Action on Patient's Safety[16]

- *Philippines' Initiatives and Developments*
- *(Including Relevant Legislations, Policies and Standards)*

- Code on Sanitation of the Philippines and Revised Implementing Rules and Regulations of Chapter XVII — "Sewage Collection and Disposal, Excreta Disposal and Drainage" of the Code on Sanitation of the Philippines (P.D. 856)[17]
- The Local Government Code of 1991 (RA No. 7160)
- Clean Water Act of 2004 (RA 9275)
- National Policy on Water Safety Plan (WSP) for All Drinking-Water Service Providers (DOH AO No. 2014-0027)
- National Building Code of the Philippines (PD No. 1096)[18]
- General Appropriation Act Fiscal Year 2021 (RA 11518)[19]
- General Appropriation Act Fiscal Year 2020 (RA No. 11465)[20]
- Occupational Safety and Health (RA No. 11058)[21]
- National Policy on Patient Safety[22]
- Safe Hospital Initiative (2011)[23]
- Universal Health Care Act (RA No. 11223)[24]
- Renewable Energy Act (RA No. 9513)[25]
- Energy Efficiency and Conservation Act (RA No. 11285)[26]
- Philippine Clean Air Act of 1999 (RA No. 8749)[27]
- Implementing Rules and Regulations of Accessibility Law (RA No. 344)[28]
- Philippine National Standards for Drinking Water of 2017[29]
- Ecological Solid Waste Management Act of 2000 (RA No. 9003)[30]
- Climate Change Act of 2009 (RA No. 9729)[31]
- National Climate Change Action Plan (NCCAP)[32]
- Philippine Nationally Determined Contribution (NDC)[33]

15 https://www.un.org/en/universal-declaration-human-rights/

16 http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_26-en.pdf

17 DOH DC 2021-0240, Revised Implementing Rules and Regulations of Chapter XVII — "Sewage Collection and Disposal, Excreta Disposal and Drainage" of the Code on Sanitation of the Philippines (P.D. 856)

18 https://www.officialgazette.gov.ph/1977/02/19/presidential-decree-no-1096-s-1977/

19 https://www.dbm.gov.ph/index.php/budget-documents/2021/general-appropriations-act-fy-2021

20 https://www.dbm.gov.ph/wp-content/uploads/GAA/GAA2020/GAA-2020-VOL-1-A.pdf

21 http://www.oshc.dole.gov.ph/images/Files/DO-198-Implementing-Rules-and-Regulations-of-Republic-Act-No_-11058-An-Act-Strengthening-Compliance-with-Occupational-Safety-and-Health-Standards-and-Providing-Penalties-for-Violations-Thereof.pdf

22 DOH Administrative Order 2008-0023

23 https://sites.google.com/site/hospitaldisasterpreparedness/safe-hospital-initiative---doh-checklist

24 https://www.officialgazette.gov.ph/2019/02/20/republic-act-no-11223/

25 https://www.officialgazette.gov.ph/2008/12/16/republic-act-no-9513/

26 https://www.doe.gov.ph/sites/default/files/pdf/issuances/ra-11285-enercon-act.pdf?ckattempt=1

27 RA 8749; An Act Providing For A Comprehensive Air Pollution Control Policy And For Other Purposes

28 https://www.ncda.gov.ph/disability-laws/implementing-rules-and-regulations-irr/irr-of-bp-344/

29 DOH Administrative Order 2017-0010, Infection and Prevention Control, June 23 2017, https://dmas.doh.gov.ph:8084/Rest/GetFile?id=337128

30 https://www.officialgazette.gov.ph/2001/01/26/republic-act-no-9003-s-2001/

31 https://www.officialgazette.gov.ph/2009/10/23/republic-act-no-9729/

32 http://climate.emb.gov.ph/wp-content/uploads/2016/06/NCCAP-1.pdf

33 https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Philippines%20First/Philippines%20-%20NDC.pdf

- National Policy on Climate Change Adaptation for the Health Sector [34]
- National Disaster Risk Reduction and Management Plan (NDRRMP)[35]
- National Climate Risk Management Framework (NCRMF)[36]
- National Policy on Disaster Risk Reduction and Management in Health (DRRM-H) [37]
- Planning in Design Guidelines for Hospitals and other Health Facilities[38]
- Policies and Guidelines on Hospitals Safe from Disasters [39]
- National Policy on Patient Safety in Health Facilities[40]
- National Policy on Infection Prevention and Control in Healthcare Facilities[41] and the National Standards in Infection Control for Healthcare Facilities Manual
- National Policy on Water, Sanitation and Hygiene (WASH) in Emergencies and Disasters[42]
- Rules and Regulations Governing the New Classification of Hospitals and Other Health Facilities in the Philippines[43]
- Guidelines on the Implementation of the Philippine Approach to Sustainable Sanitation [44]
- National Standard on the Design, Construction, Operation, and Maintenance of Septic Tank Systems [45]
- Chemical Control Order for Asbestos[46]
- Health Care Waste Management Manual, 4th Edition[47]
- Manual of Standards for Primary Care Facilities[48]and Rules and Regulations Governing the Licensure of Primary Care Facilities in the Philippines [49]
- Philippine Health Facility Development Plan 2020-2040[50]
- Incorporation of Disaster Risk Reduction and Climate Change Adaptation and Mitigation Measures in Health Care Facilities[51]

Section 5.0 Concept of Green and Safe Health Facilities

[34] DOH-AO No. 2012-005; DOH-AO No. 2012-018, Operational Guidelines of Administrative Order No. 2012-0005, "National Policy on Climate Change Adaptation for the Health Sector"

[35] https://www.adrc.asia/documents/dm_information/Philippines_NDRRM_Plan_2011-2028.pdf

[36] https://climate.gov.ph/our-programs/national-climate-risk-management-framework

[37] DOH Administrative Order No. 2019-0049; National Policy on Disaster Risk Reduction and Management in Health DRRM-H

[38] DOH AO 2016-0042, Guidelines in the Application for Department of Health Permit to Construct (DOH-PTC)

[39] DOH-AO No. 2013-001; Policies and Guidelines on Hospitals Safe from Disasters

[40] DOH-AO No. 2020-007, National Policy on Patient Safety in Health Facilities

[41] DOH-AO No. 2016-0002, National Policy on Infection Prevention and Control in Healthcare Facilities

[42] DOH-AO No. 2020-0032, National Policy on Water, Sanitation, and Hygiene (WASH)in Emergencies and Disasters

[43] DOH-AO No. 2012-0012, Rules and Regulations- Governing the New Classification of Hospitals and -Other Health Facilities in the Philippines

[44] DOH-AO No. 2019- 054; Guidelines on the Implementation of the Philippine Approach to Sustainable Sanitation (PhATSS)

[45] DOH 2019-0047; National Standard on the Design, Construction, Operation and Maintenance of Septic Tank Systems

[46] DENR-AO 2000-02; Chemical Control Order for Asbestos, http://chemical.emb.gov.ph/wp-content/uploads/2017/03/DAO-2000-02-CCO-Asbestos-1.pdf

[47] DOH Department Circular 2020-0191, Circulation of the Health Care Waste Management Manual 4th Edition

[48] DOH DC 2020-0176, Circulation of the Manual of Standards for Primary Care Facilities

[49] DOH AO 2020-0047, Rules and Regulations Governing the Licensure of Primary Care Facilities in the Philippines

[50] DOH DC 2020-0412, Circulation of the Philippine Health Facility Development Plan 2020-2040

[51] DOH DC 2021-0010, Incorporation of Disaster Risk Reduction and Climate Change Adaptation and Mitigation Measures in Health Care Facilities

The Green and Safe HF initiative represents a *climate smart* paradigm shift, away from traditional disaster response to one that proactively seeks to minimize the health impact of disasters and emergencies through climate adaptation and mitigation measures (including climate-proofing and reduction of the environmental footprint), and preparedness. Consequently, it is essential that this Green Manual is incorporated into the hospital and HF development agenda that are backed with earmarked resources in the national budget, and that has governance and support from the highest levels of government.

The Department of Health shall, as much as possible, promote the greening of hospitals and health facilities, including the improvement of energy and water efficiency and conservation, sustainable cooling systems, and sustainable healthcare waste management in hospitals.[52]

5.1 Climate change disrupts the delivery of health care services. The increased intensity of natural disasters challenges the structural integrity of HFs, as well as the infrastructure, support systems and supply chains that these facilities and their communities depend upon. Increased sea level rise together with the increased intensity rain and winds from typhoons and tropical storms are causing increasingly widespread and prolonged flooding, which are disrupting vulnerable infrastructure and transportation systems, as well as the delivery of materials and food.

5.2 Flooding can cause significant damage to hospital mechanical equipment, which often is located at or below grade. The prolonged high winds during these storms can damage rooftop equipment, and cause significant structural damage to buildings, electric transmission lines, and other public infrastructure.

5.3 Conversely, climate change driven alterations of weather patterns can prolong periods of drought and intensity of heat waves, disrupting water supplies and increasing the risk and scale of wildfires, which impact HFs.

5.4 Extreme weather driven by climate change can have substantial impacts on the health of communities, and the demands on the health systems that serve them. As first responders to emergencies, health systems protect the health of their communities during and after natural disasters. However, they are vulnerable to the impacts of these disasters and of climate change more broadly. Improving the resilience of HFs enables hospitals and health systems to continue to provide essential health services during floods and droughts driven by climate change.

An ensured safe environment in the health facility, or the provision of safe and quality health service that is responsive to the needs of the people, is a vital pillar in helping achieve Universal Health Care. Patient safety is a fundamental element of health care and is regarded as an essential component for improving health outcomes. [53]

5.5 All government instrumentalities, national and local, are mandated to adopt a

[52] Section 37 of RA No. 11518, GAA Fiscal Year 2021, Volume 1-A, XIII DOH Special Provision

[53] DOH Administrative Order 2020-0007 entitled National Policy on Patient Safety in Health Facilities, Feb 11, 2020

whole-of-government approach towards the nation's climate resilience,[54] which would mean seamless collaborative undertakings in the following:

- Enhancing the nation's climate and disaster resilience towards building safe, adaptive and resilient communities;
- Ensuring the continuity of service delivery to the general public before, during and after occurrence of natural disasters; and
- Expeditiously implementing climate and disaster resilience programs, projects and activities incorporated in their respective budgets.

As a complementary measure, all government instrumentalities are directed to maximize the utilization of their resources towards enhancing the country's resilience to natural hazards, especially floods, erosion and landslides, storm surges, typhoons, earthquakes, global warming, drought, sea-level rise, among others.

5.6 In the mainstreaming of disaster risk reduction and climate change adaptation and mitigation,[55] all agencies of government shall plan and implement programs and projects that take into consideration measures for these two areas, and that are based on climate and disaster risk assessments.

All agencies shall undertake efforts to integrate environmental sustainability in their daily activities, systems, processes and operations, and accelerate the greening of their organizational culture and behavior towards reducing their carbon footprint, through saving on paper and printing, minimizing the use of plastic and food waste, switching to renewable energy, reducing energy and water consumption, holding meetings online, and reducing travel emissions.[56]

5.7 On the other hand, HFs such as hospitals are leading consumers of energy, with a large environmental footprint that contribute to the country's carbon emissions. Such emissions can be mitigated by using renewable and clean energy, and by using materials that can conserve energy consumption.

5.8 The conceptual framework of the policy for green and safe HFs is built around three principal objectives as shown in Figure 1.

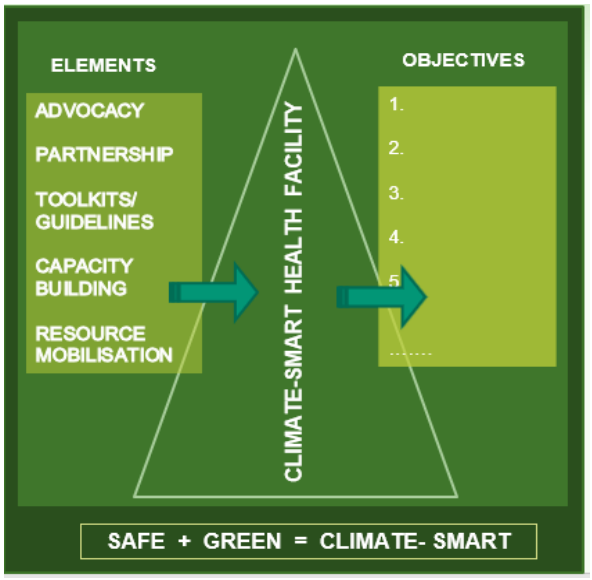
A climate smart facility – applies green interventions to its structures and operations[57] to achieve the following:

- Protection of the lives of patients and health workers;
- Reduction of damage to health infrastructure and equipment as well as the surrounding environment;
- Continued functioning as part of the health network, with provision of services under emergency conditions to those affected by a disaster;
- Use of scarce resources more efficiently, thereby generating cost savings;
- Improvement of strategies to adjust to and cope better with future hazards and

[54] Sec 38 of RA 11260, GAA Fiscal Year 2019 I-B pp 935
[55] Sec.36 of RA 11465, GAA Fiscal Year 2020 I-B pp 591-592
[56] Sec 37 of RA 11260, GAA Fiscal Year 2019 I-B pp 935
[57] Smart Hospitals Toolkit. Washington, D.C.: WHO, PAHO; 2017.

climate change.

Figure 1
Conceptual framework for the policy on green and safe (climate smart) health facilities.



Note on Figure 1. This framework represents a seamless set of activities and interventions — from preparedness to mitigation; planning to prediction; and response to recovery — all directed towards achieving disaster resilience; adapting to climate change; reducing the carbon footprint; and improving environmental sustainability.

5.9 Hospitals and other health facilities are vulnerable to climate change and other environmental stresses. Built structures have negative impacts on the environment, and consequently on human health. Safe, sustainable and resilient health infrastructure is essential to the country's goal of reducing the supply gaps in health facilities.[58]

Initiatives in green and safe HFs are expected to yield benefits in the long run. To become climate smart, an HF must make its buildings and operations more resilient, mitigate its impact on the environment, and reduce pollution. These interventions will save costs, reduce greenhouse gas emissions, improve air quality, reduce transmissions of airborne infections and aggravation of respiratory conditions, increase productivity, improve staff and patient satisfaction, improve physical access, improve safe water, sanitation and hygiene, and achieve adaptation, risk reduction and development benefits.

5.10 Government agencies concerned shall prioritize the repair and retrofitting of government structures in areas considered highly vulnerable to seismic activity and shall ensure that the retrofitting shall result in structural strength required for the area concerned in accordance with Republic Act No. 10121, or Philippine Disaster Reduction and Management Act, and in accordance with the National Structural Code of the Philippines.[59]

5.11 This Green Manual shall ensure its consistency with the provisions of the Philippine Green Building Code (GB Code), and green and safe HF initiatives shall

[58] DOH DC 2021-0010, Incorporation of Disaster Risk Reduction and Climate Change Adaptation and Mitigation Measures in Health facilities
[59] Sec.40 of RA 11465, GAA Fiscal Year 2020 I-B pp 591-592

harmonize with health facility and public health programs, activities and projects of the DOH including but not limited to the following:

- Climate Change and Health
- Health Care Waste Management
- Health Facilities Enhancement Program
- Licensing Standards for Health Care Facilities
- National Policy on Health Emergencies and Disasters
- Hospitals Safe from Disasters
- Infection Prevention and Control in Health Facilities
- Integrated Hospital Operations and Management Program
- Integrated People-Centered Health Services
- Patient Safety in Health Facilities Program
- Philippine Health Facility Development Plan
- Standards for Primary Care Facilities
- Technical Guidelines for Hospital Planning and Design
- National Standards for Drinking Water
- Water, Sanitation, and Hygiene in Health Facilities

5.12 In line with the continuing efforts in Green and Safe Health Facilities and Climate Smart Health Care, the Department of Health encourages health facilities to incorporate disaster risk reduction and climate change adaptation and mitigation measures in facilities.[60] Also, As the country transitions into the New Normal, health facilities must plan ahead and adopt policies, protocols, and behaviors to ensure that there is continued health service delivery while maintaining public health standards for COVID-19 disease.[61]

To be climate smart, an HF shall commit to increasing its safety, sustainability and resilience. The HF can realize its commitments by investing in the performance standards in this Green Manual, which can also reduce operating costs and improve overall resilience in the community.

Section 6.0 Facilities' Use/Occupancy Coverage and Application

6.1 In line with its continuing efforts in green and safe HFs, the DOH shall encourage national and local government hospitals and other HFs to seek green certifications from Green Building Rating System/s for their new construction or expansion, repair and renovation projects.[62]

6.2 Presidential Decree (PD) No. 1096, or the National Building Code of the Philippines (NBCP), and its implementing rules and regulations (IRR) shall be set as the minimum requirement for all construction, alterations, additions, conversions, and renovations of HFs.

6.3 Provisions of PD No. 1096, its IRR, and the GB Code as the referral code of the

[60] Section 37 of RA No. 11518, GAA Fiscal Year 2021
[61] DOH DM 2020-0268, Interim Guidelines on Health Facilities in the Normal
[62] DOH Department Circular 2019-0059

NBCP shall be supplementary to this Green Manual. Per its Sections 8.1, 8.2, 8.3 and 8.4, the GB Code shall apply to all new construction and/or alteration of buildings, which fall over the benchmark of the required total gross floor area (TGFA) for institutional/health facility. Compliance of HFs that do not meet the benchmark shall be voluntary. Therefore, with regard to compliance with this Green Manual:

(a) All new HFs with 10,000 square-meter (sqm) TGFA constructed after the effectivity of the Manual are required to comply with all the appropriate provisions;
(b) All existing HFs with 10,000 sqm TGFA constructed after June 2015 but before the activity of this Green Manual shall be required to retrofit;
(c) All existing HFs with 10,000 sqm TGFA constructed before June 2015 shall be voluntary; and
(d) All HFs with less than 10,000 sqm TGFA shall be voluntary.

Section 7.0 Implementation of the Requirements of the Manual

The following underscores the importance of outlining steps, and in defining roles and responsibilities for the implementation of green and safe HF guidelines from the national and local levels. Information herein provides the application of these guidelines to specific health care settings, using the guidelines to develop minimum standards (which can be used to assess standards that are already in place), choosing appropriate technology for implementation, and ensuring monitoring, improvements and staff training.

7.1 Enabling policy environment

Enabling policies are required at national, regional, provincial, district and local health settings to create a positive and supportive policy environment in compliance to the requirements of this Green Manual. This should allow stakeholders at all levels to establish effective governance and management arrangements to plan, fund, implement and coordinate improvements and maintain standards, based on this Green Manual.

7.2 Management of standards at all levels

This Green Manual contains the standards to be used at national, regional, provincial, district and local levels. To implement the Standards and Guidelines of this Green Manual the steps are shown in Table 1. The levels presented in the table are intended as a general illustration of how related activities are required at different levels.

Table 1

Phases in Establishing and Managing Appropriate Standards at All Levels[63]

	National & Regional	**Provincial & District**	**City, Municipal & Local**
1	Review existing national policies and ensure that there is a national policy framework that supports improved conditions in HFs.	Raise awareness on green and safe HFs among key stakeholders.	Mobilize support from health workers, local communities and other local stakeholders to achieve and sustain a healthy health care environment. Promote a working climate that encourages patient and health workers‘ safety.
2	Ensure that national bodies exist for setting and monitoring standards.	Ensure that an appropriate body or service exists for overseeing compliance with green and safe HFs.	Create and assign responsibility to a local body to oversee the implementation of national standards at HFs. Promote a working climate that encourages patient and health workers‘ safety.
3	Provide national expertise and knowledge through information dissemination mechanisms.	Provide expertise and resources for assessment and planning.	Assess existing conditions, consult local stakeholders (including health workers and local community) and plan improvements and new developments.
4	Review national standards and add to them if needed. Ensure that there is an effective regulatory framework that encourages and supports compliance.	Ensure that the national regulatory framework is reflected in guidance and support for compliance. Develop and use guidelines where national standards do not exist.	Define a set of targets, policies and procedures for implementing national standards and/or guidelines in a way that reflects local conditions through ordinances. Define how targets, policies and procedures will be applied.
5	Provide and/or facilitate funding for national programs.	Allocate funding for planned improvements and new developments.	Seek funding for planned improvements and new developments.
6	Monitor progress and promote consistent application of standards at all levels.	Ensure oversight of improvements and new developments to ensure the consistent application of national standards in all HFs.	Oversee implementation of planned improvements and new developments.
7	Produce training and information materials appropriate to a range of health-care settings. Ensure appropriate modules for health workers‘ training.	Provide appropriate training and information to health workers.	Provide advice and training to health workers and patients.
8	Periodic review and update of policies, standards, training contents, evaluation and monitoring tools.	Inform key stakeholders on updated green and safe components in HFCs.	Mobilize support from health workers, local communities and other local stakeholders to improve, achieve and sustain a healthy health-care environment. Promote a working climate that encourages patient and health workers‘ safety

[63] Essential Environment Health Standards in Health Care, 2008

7.3 Roles and responsibilities of stakeholders

The roles and responsibilities of stakeholders at all levels in implementing guidelines and standards for green and safe health facilities are listed below. It also outlines some of the things they can do to help achieve and maintain green and safe conditions in health facilities. The list on Table 2 is not exhaustive and can be added to any context.

Table 2
Stakeholder groups and their contributions to improved green and safe environments in health facilities.

Stakeholder Group	Expected Contributions
Patients	▪ Comply with all applicable green, safe, clean, hygienic and sanitary requirements
Patients' Families and Carers	▪ Comply with all applicable green, safe, clean, hygienic and sanitary requirements ▪ Encourage patients and other carers to do the same
Health Workers and Ancillary Staff of HFs (e.g. Cleaners, Sanitation Workers, etc.)	▪ Maintain and observe the appropriate green, safe, clean, hygienic and sanitary conduct ▪ Carry out infection prevention and control measures (such as cleaning, health care waste management, hand hygiene and aseptic procedures in health care) consistently and well ▪ Care for and maintain green, safe, clean, hygienic and sanitary facilities ▪ Encourage patients and carers to adopt appropriate behaviors ▪ Participate actively in achieving and maintaining targets
Managers of Public and Private HFs	▪ Plan and implement programs to set, achieve, monitor and maintain targets ▪ Create conditions in which HFs staff are motivated to meet and maintain targets
Health Authorities	▪ Provide resources and direction for setting, achieving and maintaining targets for green, safe, clean, hygienic and sanitary services ▪ Collect and dispose of health care waste in an approved facility ▪ Provide specialist advice for identifying problems and recommending solutions for green and safe HFs
Educators and the Education Sector	▪ Raise awareness in medical and allied health schools and other sectors ▪ Provide training and research on green and safe HFs
Other Leaders and Officials in Government	▪ Provide and mobilize political and financial support for the establishment of green and safe HFs
Regulators of Building and Environmental Design	▪ Ensure correct and appropriate engineering design and construction of HFs in compliance to green and safe environmental requirements
Construction and Maintenance Industries	▪ Provide skilled services that comply with national standards for construction, maintenance and repair of HFs
National and International Funding Bodies	▪ Provide funding for new HFs, upgrading or renovation of existing ones and ongoing, maintenance of target HFs
Non-governmental and Community-based Organizations	▪ Participate in disease control sessions through community health organizations that might exist ▪ Report on health care waste found outside HFs

The level of participation described above is achievable through the allocation of resources and commitment at all levels. Effective linkages among government agencies, private sector, local communities, and other stakeholders are essential. Local government and inter agencies/inter sectoral bodies, may be useful for joint planning, implementing and monitoring of improvements

7.4 Coordination in the health facilities

Managing the various and interdependent aspects of a green and safe environment at the level of the HF should involve all staff, patients and carers. There should be a clearly identified body with the authority and resources required to carry out activities.

In hospitals and other larger settings, a committee may be required for planning, coordinating and monitoring implementation of targets. Members of the committee should include managers, clinicians, technical and ancillary staff. In smaller settings such as the primary care facility, the roles may be taken on by one staff member or volunteer, who should receive support from environmental health officers or other infection control staff based at the district level.

In these guidelines, the term Green and Safe Health Facility Committee is used to describe a body at the local level or the health care setting. This body may comprise a group of persons or a single person, may be responsible for all aspects of green and safe environment, or greening of facilities such as improvement of energy and water efficiency, sustainable cooling systems, and sustainable healthcare waste management.

7.5 Creating standards for specific health facilities

The guidelines reflect general principles for providing adequate green and safe health facilities, minimizing the health care associated disease risk to staff, patients and carers, and focusing on the safety of the facilities' buildings. They can be used to create specific targets or standards appropriate for hospitals and other health care settings. Consider the following steps in targeting:

Step 1: Review the National standards and guidelines, which are narrative statements describing the situation to be aimed for.

Step 2: Identify major areas that require attention in relation to specific guidelines. Consider on-site conditions that might affect the way that the guidelines are interpreted in practice. Note on-site constraints such as lack of funding or lack of suitable space, but these should not be taken into consideration at this step. Aim first to define appropriate standards required in a setting, then seek ways to meet those standards.

Step 3: Use national standards or the indicators under each guideline to define specific targets or standards such as the number of users per toilet, or the quantity of water per person per day required. Indicators provide benchmarks that reflect current understanding of appropriate levels of service required to create a green and safe HF. Guidance notes provide advice on taking account local conditions when using the indicators for setting specific targets or standards and on intermediate steps to reach them.

7.6 Assessing current status and planning for improvement

Once specific standards have been defined for the criteria, they can be used as a checklist to determine how and to what extent the existing situation falls short of them. This will identify specific problems that needed to be addressed.

As possible, reasons for shortfalls should be analyzed in an inclusive way. Most solutions will require the participation of multiple parties including patients, carers, health care workers and health managers. A useful tool for this analysis is the problem–solution tree, a simple method to identify problems, their causes and effects, and then define objectives for improvement that are achievable and appropriate for the specific conditions of each health care setting. As a group activity, the problem–solution tree involves the following steps:

Step 1: Discuss any major aspects of the current situation where water supply, sanitation, health care waste management and hygiene targets defined for the health care setting are not met. Write each one in large letters on a small piece of paper (e.g. A6 size) or a postcard.

Step 2: For each major problem, discuss its causes by asking "why?" For each of the contributing problems identified, ask "why?" again, and so on until root causes for each problem have been revealed and agreed. Write all the contributing problems in large letters on a piece of paper or postcard and stick them on a wall, arranged in a way that reflects their relation to each other and to the major problem.

Step 3: For each of the contributing problems noted, discuss possible solutions. Check that these solutions contribute to solving the major problems identified by asking "what?" to identify the effects of the action. Some solutions proposed will probably have to be abandoned because they are not realistic given current conditions, or because they do not have sufficient impact on the major problems.

Step 4: Once several feasible solutions have been agreed, phrase them as objectives. For each objective, discuss and agree on a strategy (how the objectives can be reached), responsibilities (who will do what), timing, resources and requirements.

At the end of the activity, the objectives should be understandable and motivating to all those concerned by their achievement, and progress towards achieving them should be possible to measure and describe easily and clearly.

7.7 Phasing of improvements

Many HFs are currently far from achieving acceptable levels of a green and safe environment, and some may have no suitable facilities at all because of lack of resources, skills or adequate institutional support. Often, achieving appropriate standards will not be possible in the short term. Therefore, steps should be taken to prioritize improvements, and to work in a phased manner so that the most urgent problems can be identified and addressed immediately, then other benefits be achieved subsequently.

7.8 Technology choice, operation and maintenance

Maintenance, repair and eventual replacement of green and safe HFs should be considered while they are being designed and built. The maintenance, repair, and replacement of water supplies, sanitation, ventilation systems and health care waste facilities should be planned and budgeted from the beginning of a program that either improves the HF or builds a new one.

As far as possible, facilities should be durable, sturdy, and require minimum maintenance and basic skills to be kept running at optimum level. The long-run functionality of new equipment should be considered when making a more cost-effective choice in technology solution.

Responsibilities for operation and maintenance should be clearly defined, and appropriate expertise provided. Training for end users should be provided for new technology for sustainable operation and maintenance.

7.9 Ongoing monitoring, review and correction

Maintaining acceptable conditions requires ongoing efforts at all levels. The Green and Safe Health Facility Committee has a critical role in ensuring regular monitoring of environmental health and building conditions. The local health unit of the LGU should be the Committee's partner in expert monitoring and advice, where the green and safe HF is included in regular quality surveillance and control programs.

A monitoring system should use a limited set of indicators (such as behavioral indication) that are easily and frequently measured to identify problems and correct them in a timely way. For example, water shortages at handwashing points may be monitored by staff according to an organized schedule, and signaled immediately to caretakers or maintenance staff, where these exist, for action. A periodic review of green and safe facilities should also be carried out in a way that illustrates the links between the various activities. As in assessments, reviews should seek to identify causes for problems and then propose realistic solutions.

Monitoring and Evaluation forms should be developed at the level of the HFs, or at the district or national level for standardized monitoring reports. This will allow data from all HFs to be collated and compared.

7.10 Staff training requirements

A training module shall be developed for compliance on green and safe HFs. Regular training for staff to provide updates on policies and standards on Green and Safe HFs must be conducted. All health care workers and hospital staff also must undergo the Hospitals Safe from Disasters training modules (i.e., Safe Hospitals in Emergencies and Disasters[64], Hospital Safety Index[65], etc.). The hospital building administrator or evaluator or a multidisciplinary team must know how to apply the Hospital Safety Index tool in assessing the safety of hospital buildings in the event of emergencies and disasters.

Infection prevention and control (IPC) should have a central place in the training and supervision of health care workers and HF staff. The performance of routine IPC activities (e.g. hand hygiene, cleaning and disinfection) is actually part of the health care workers' service provision. But because hygiene is important in all health care settings (even in home care), patients and carers, and not just HF staff, should be constantly reminded about IPC and their required routine measures.

[64] https://home.doh.gov.ph/uploads/downloads/DOH_INTRANET_safehospitalsinemergenciesphilippineindicators_225104.pdf
[65] https://www.doh.gov.ph/hospital-safety-index

While health care workers have a primary role in health promotion,[66] such however may be limited to provision of basic information like the location and proper use of toilets and handwashing points in the HFs.

In larger settings like hospitals, staff like janitors, food handlers and waste handlers have IPC-related responsibilities. In their training and management, their role in the IPC program and the application of IPC principles in their daily course of work must be emphasized. Meanwhile in smaller settings like primary care facility, the health care workers may be required to perform both medical and non-medical tasks, which in the latter could include operating and maintaining environmental health facilities.

Health care waste management too must be attended not only by those involved in the collection of waste but all health care workers and HF staff.

Where the building design and mechanical services form part of the green and safe HFs as well as the IPC strategy (e.g. isolation rooms, ventilation), staff training should include the correct operational procedures to ensure that energy, fuel and water are conserved, and safety and protection is maintained.

[66] Essential Environment Health Standards in Health Care, 2008

CHAPTER 2

PROVISIONS ON GOVERNANCE AND PERFORMANCE STANDARDS

Chapter 2

Provisions on Governance and Performance Standards

Green & Safe Health Facilities Manual

Section	
8.0	**Governance**
9.0	**Performance Standards**

Section 8.0 Governance

8.1 Leadership and Management

The Department of Health (DOH) as the nation's leader in health shall take the leadership and management roles in the implementation of the Green and Safe Health Facility (HF) standards and guidelines.

Aligned with the country's vision of *matatag, maginhawa at panatag na buhay*, or *AmBisyon Natin* 2040, the DOH's aspiration for the Filipinos is that we are among the healthiest people in Southeast Asia by 2022, and in Asia by 2040. Its flagship program *FOUR*mula One Plus for Health (F1 Plus) is strategically directed to the DOH vision and towards achieving universal health care for all. R.A. No. 11223, the Universal Health Care (UHC) Act, is the new mandate in health that fulfills F1 Plus, and is responsive to reducing vulnerability to climate change and disaster impacts by seeking people's access and equity to health. The National Objectives for Health (2017-2022) likewise corresponds with its aim to increase access and provision of quality health services and products in emergencies and disasters. The 2011-2018 National Disaster Risk Reduction and Management Plan captures both *AmBisyon Natin* 2040 and UHC in its purpose towards sustainable development via safer, adaptive and disaster resilient Filipino communities.[67]

With this, the DOH enjoins chiefs of all hospitals and medical centers and heads of other HFs to implement green and safe standards, spearhead the creation of policies consistent with this Green Manual, and coordinate with the DOH to properly implement the provisions of this Green Manual.

Local Chief Executives shall direct their respective health officials, chiefs of all LGU hospitals and medical centers, and heads of other LGU HFs to lead in the management of the provisions of this Green Manual.

The DOH shall coordinate with Climate Change Commission and Department of the Interior and Local Government to promote the greening of hospitals and HFs through improving efficiency and conservation of energy and water, sustainable cooling systems, and sustainable health care waste management.[68]

8.2 Applicability

This measure on green and safe (climate smart) health care governance applies to all Government-owned as well as privately owned HFs.

8.3 Requirements

Green and safe (climate smart) governance requirements include DOH designation of offices for the purpose, the creation of a technical working group, delegation for facility-based management, commitment-setting towards implementing the standards and guidelines, and establishment of recognition for green and safe HFs.

(a) Office for the Green and Safe Health facilities

The DOH is responsible for designating the Office which shall serve as the center

[67] DOH Administrative Order 2019-0046 entitled National Policy on Disaster Risk Reduction and Management in Health DRRM-H, October 29, 2019

[68] Special Provision section 11, Green Hospital, RA 11260, GAA FY 2019

for development and promotion of green HFs in the Philippines. It shall be in charge of all technical support assistance in this respect. Its staffing shall include architects, engineers, other health professionals and technicians who possess adequate knowledge and experience in the field of green building design and patient management. In a leadership role, this DOH Office shall:

- Influence, motivate, convince, and make members of the health community and the public on the goals and tasks of green HFs; and
- Assure continuation of green HGF efforts by deepening the motivation of the members of the health community in working towards this.

In relation to the DOH mandate to address the health needs of the affected populations in emergencies and disasters, conflicts, epidemics and pandemics,[69] the Health Emergency Management Bureau (HEMB) shall be in charge of monitoring the safety aspects of hospitals and other HFs.

In a management role, the Health Facility Development Bureau (HFDB) shall have a Green and Safe Health Facilities Program that endeavors to attain its goals with the cooperation of hospitals and other HFs. The program shall:

- In a planning process, identify short- and long-term goals, and develop the tasks that must be performed towards their attainment, how the tasks must be performed, and when they should be performed; and
- Organize all HFs and other organizations, and assign the tasks developed to produce outputs that individual and organizational members will contribute to the success of green and safe HF initiatives.

(b) Technical Working Group

The DOH shall convene a Technical Working Group every three years to review the applicability, exceptions and relevance of the provisions of the Green Manual, its standards and guidelines, and shall upgrade these provisions as necessary and in accordance with emerging developments and trends.

(c) Green and Safe (Climate smart) Management in the Facilities

The DOH shall delegate the responsibility of ensuring compliance to the requirements indicated in this Green Manual to the engineering and administrative units of hospitals and other HFs. The facilities are encouraged to create their respective monitoring teams.

Through the HFDB, the DOH shall initially provide all HFs with an assessment checklist. This checklist may be used as one of the tools for the continuous improvement and good practices of all HFs until such time that the facilities shall have imbibed such green concepts into their systems.

All HFs may be evaluated by administering the survey questionnaire “Green Viability Assessment Tool” (see Annex 1 of the Green Manual). The tool shall be administered to at least three (3) key officers and staff of hospitals and other HFs such as the Hospital/HF Chief, Chief of Professional Medical Staff, Chief Administrative Officer, and Energy Efficiency and Conservation (EEC) Officer.

[69] DOH Administrative Order 2019-0046 entitled National Policy on Disaster Risk Reduction and Management in Health DRRM-H, October 29, 2019

(d) Recognition of Green and Safe Health Facilities

The DOH shall have a system for identifying outstanding HFs that have enhanced their compliance to this Green Manual using the following criteria:

Table 3
Criteria and compliance system for outstanding green and safe (climate smart) health facilities.

Criterion	Compliance
Energy Efficiency	Reduction of energy consumption, use of renewable and clean energies
Water Efficiency, Sanitation and Hygiene	Adequate water, water reuse/recycling, water conservation, rainwater harvesting. Safe drinking water, proper use and maintenance of sanitary toilet facilities, functional handwashing, provision of soap and disinfectant, regular/periodic desludging of septic tanks, proper drainage system
Health Care Waste Management	Waste segregation, collection, storage, transport, treatment, proper waste disposal, recycling
Site Sustainability	Healing gardens within, fresh air, herbal plants, accessibility, existence of alternative routes
Material Sustainability	Use of sustainable materials, procurement of sustainable and recyclable products, less use of hazardous and toxic substances
Indoor Environmental Quality	Lighting, ventilation, interior design, air quality management
Environmentally Resilient Health Facility	Structural member, non-structural member, emergency and disaster preparedness plan
Governance	Leadership and management, trainings, proper implementation, commitment

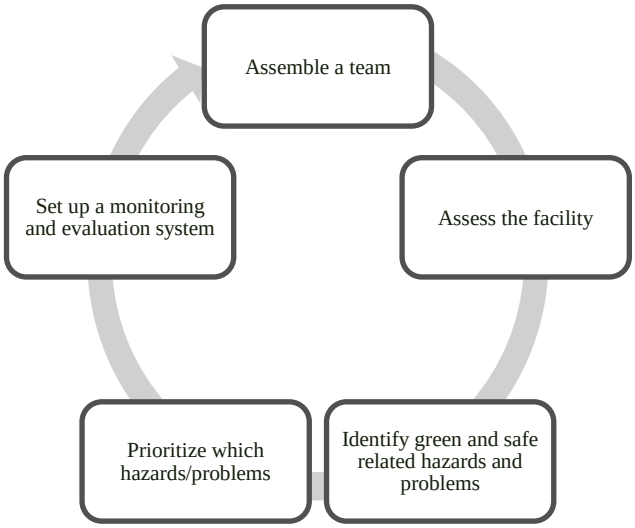
(e) Implementing Green and Safe Health facilities

Commitment of the top management of hospitals and other HFs are of prime importance in the implementation of this Green Manual. Heads of HFs must designate their point persons in charge of ensuring that the minimum requirements of this Green Manual are applied in their respective facilities.

The designated point persons must have vision and commitment. They must have the authority to ensure that the specific tasks and tools are accomplished within the prescribed time. Regular meetings must be conducted, and decisions acted upon for the improvement of health outcomes in the HFs. To implement a green and safe health facility, the steps enumerated in Figure 2 can be followed using the key concepts indicated in the Water and Sanitation for Health Facility Improvement Tool (WASH FIT)[70] published by the World Health Organization (WHO).

[70] Water and Sanitation in Health Facility Improvement Tool (WASH FIT), WHO, 2018

Figure 2. Steps to implement a green and safe health facility adapted from WASH FIT



Step 1: Assemble a team that has the support from the top management, conduct regular meetings, implement and follow through with the plan for improving a green and safe health facility.

Step 2: Assess the facility as a basis for making improvement

Step 3: Identify green and safe related hazards and problems, the associated risks that these hazards present to general staff, patients and watchers and the areas for improvement in the facility.

Step 4: Prioritize which hazards/problems will be addressed and develop a detailed action plan stating the improvements to be made within the prescribed period.

Step 5: Set up a monitoring and evaluation system to determine effectiveness of the action plan.

This Green Manual was developed to implement the GB Code while ensuring the health and safety of the people consonant with the mandate entrusted to the DOH. The manual does not, in any way, take away or diminish the powers and authority vested to the building officials from the local and national government including the Department of Public Works and Highways (DPWH) and other concerned agencies.

Section 9.0 Performance Standards

This Green Manual contains the following performance standards, which in this order, guidelines and other details are described from Sections 10 to 17:

- Governance
- Energy Efficiency
- Water Efficiency, Sanitation and Hygiene
- Health Care Waste Management
- Environmentally Resilient Health Facility
- Site Sustainability
- Materials Sustainability
- Indoor Environmental Quality

CHAPTER 3

ENERGY EFFICIENCY

Chapter 3

Energy Efficiency

Green & Safe Health Facilities Manual

Section

Section 10. Energy

10.1 General

a. The increase in temperature around the world, known as global warming, is due to excessive release of greenhouse gases brought by human activities. Due to varying weather conditions, there is a tendency to consume a higher amount of energy during the summer season, particularly in tropical countries like the Philippines.

b. The World Bank (2011)[71] estimated that the health sector contributes, on average, 5 percent of all greenhouse gas emissions globally. Based on this figure, it could be conservatively estimated that the healthcare sector generated 2.6 billion out of the 52 billion metric tons of CO_2 emitted globally in 2011. In the Philippines, out of 164 million metric tons of CO_2 emission, about 8 million metric tons are coming from the health sector.

c. All national government agencies, LGUs, and, and GOCCs shall embark on energy efficiency measures, including the adaptation of a standard thermostat level based on the DOE's energy conservation program, and the use of energy efficient lighting, such as light-emitting diode (LED) lamps, in their office buildings, school building, hospitals, markets, parks, street lights and other public places.[72]

d. Guidelines on Energy Conserving Design of Buildings[73] emphasize the encouragement and promotion of the energy conserving design of buildings and their services to reduce the use of energy with due regard to the cost effectiveness, building function, and comfort, health, safety and productivity of the occupants.

e. All energy end users, including the end users defined under Republic Act No. 9513, otherwise known as the Renewable Energy Act of 2008, shall use every available energy resource efficiently and promote the development and utilization of new and alternative energy efficient technologies and systems, including renewable energy technologies and systems across sectors in compliance with the declared policies of the Act and the EEC-IRR. [74]

f. Hospitals operate 24/7 and consume a large amount of electricity to provide service and deploy critical machines that require reliable electricity. To maintain the energy reliability, hospitals usually equip diesel electricity generators, which are expensive and produce greenhouse gas (GHG) emissions. Therefore, there are potentials for hospitals to improve energy efficiency and provide energy flexibility to the electricity grid.[75]

g. All types of energy available commercially including natural gas (liquid natural gas and liquid gas), all heating and cooling fuels (including district

[71] World Bank (2017). Climate-smart healthcare: low-carbon and resilience strategies for the health sector

[72] Sec. 37 of RA 11465, GAA Fiscal Year 2020 pp. 592

[73] Department of Energy (DOE), 2007, Guidelines on Energy Conserving Designs of Buildings

[74] DOE DC 2019-0014: IRR of RA 11285 (Energy Efficiency and Conservation Act)

[75] Billanes, J D. et al, 2018, The Bright Green Hospitals, Case Studies of Hospitals' Energy Efficiency and Flexibility in Philippines, https://www.researchgate.net/publication/330707330

heating and district cooling), coal, transport fuels and renewable energy sources[76].Health facilities' fossil fuel-based energy use makes up most of health care emissions. Therefore, low carbon strategies in health facilities that are already consuming large quantities of energy require a multi-pronged strategy for reduction of energy use while maintaining or even improving the quality of care. These strategies can also have the added benefit of yielding financial savings.

10.2 Applicability

10.2.1 This measure applies to all Health Facilities (HFs) design of:

a. Government and Private
b. New buildings and their systems; and
c. Any expansion and/or modification of buildings or systems.

10.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

10.3 Requirements

10.3.1 Energy Label

Upon issuance of the Philippine Energy Labelling Program (PELP) by the DOE Energy Utilization Management Bureau (EUMB), consider the specifications of listed appliances in the program as reference of the succeeding procurement for the entire DOH health facilities, while still complying with the provisions of R.A. 9184.

For the procurement of energy consuming products, presence of a yellow - colored card or tag attached on products or printed on the box must be specified to provide information on how the products perform in terms of power consumption, energy efficiency or capacity.

10.3.2 Government Energy Management Program (GEMP)[77] and other related issuances

GEMP based on Department Circular No. 2019-11-0014: Implementing Rules and Regulations of Republic Act No. 11285 (Energy Efficiency and Conservation Act) aims to reduce monthly consumption of electricity and transport petroleum products by at least ten (10%) percent in all Government Agencies, Government Owned and Controlled Corporations, State Colleges and Universities, Hospitals and other instrumentalities of the government except for constitutional bodies including the judiciary and legislative body.

Each government entity, including government-owned hospitals and other HFs, shall formulate an energy efficiency and conservation program to include energy conservation measures, target savings, motor vehicle inventory and other strategies consistent with the GEMP as well as compliance to Section 44 and 45 of the EEC-IRR. It shall also allocate appropriate amounts from its approved annual budget

[76] Sec. 2 of the Republic Act 11285, Energy Efficiency and Conservation Act

[77] Department Circular No. 2019-11-0014: Implementing Rules and Regulations of Republic Act No. 11285 (Energy Efficiency and Conservation Act)

for the implementation of its prioritized and planned energy management program and shall include budget preparation necessary funds for its energy management program from 2020 onwards.

For government health facilities, the Energy Efficiency and Conservation (EE&C) Officer (see section 11.3.2a) shall be in charge of compliance with the Government Energy Management Program (GEMP).

For private health facilities, this Government Energy Management Program (GEMP) can be adopted.

There are Department of Energy Administrative Orders and IRR related to the GEMP, such as:

a. DOE AO 103 s.2004 - directs the Continued Adoption of Austerity Measures in the Government while Sec. 1., (a), (2) Reduction of at least ten percent (10%) in the cost of fuel, water, office supplies, electricity and other utilities. For this purpose, agencies are hereby authorized to install and use energy-efficient lights and fixtures.

b. DOE AO 110 s.2004 - Directing the Institutionalization of a Government Energy Management Program (GEMP) with the aim of electricity and fuel reduction of 10% ad for all Government Officer compliance including the hospital and health facilities and the inter-agency coordination.

c. DOE AO 110 – A s.2006 - Amending AO 110 S.2004 Directing the Institutionalization of GEMP wherein the Energy Savings realized through the GEMP may be used by the government entity for the improvement of energy efficiency, subject to the guidelines promulgated by DOE and DBM.

d. DOE AO 183 s.2007 - Directing the Use of Energy Efficient Lighting/Lighting System (EELs) in Government Facilities (Palit-Ilaw Program)

DOE IRR of AO 110 s.2008 – Implementing Rules and Regulations Directing the Institutionalization of a GEMP. An Energy Conservation Program (ECP) shall be formulated by each government entity to include energy conservation measures, target savings, motor vehicle inventory and other strategies.

10.3.2.a Designation of Energy Efficiency and Conservation (EE&C) Officer of Health Facility

With the DOH Department Memorandum No. 2020-0051 enjoined to designate one (1) Energy Efficiency and Conservation (EE&C) Officer who meet the following minimum requirements to fully address the GEMP's thrust:

- Must be a licensed engineer (preferably Electrical Engineer) or a graduate of a four (4) year course or its equivalent
- With at least three (3) years of continuous hands-on experience in the installation, operation, and maintenance of energy-consuming machines and equipment in an energy consuming facility

As a continuing qualification, the appointee shall undergo ECC seminars and

training conducted by the DOH, DOE, or any third-party institution duly approved by the DOE. The EE&C Officer shall have the following duties and responsibilities:

- Management of energy consumption of facilities, equipment, and devices Implementation and improvement of energy efficiency measures Conduct of regular energy audit.
- Conduct of energy monitoring and control
- Preparation of periodic energy consumption and energy conservation program reports.
- Preparation, formulation and submission for approval of the head of the government entity the design, plan and implementation, monitoring and evaluation scheme for the energy efficiency and conservation program consistent with the GEMP.
- Submission to the DOE of the government entity's approved annual energy efficiency and conservation program, or any modifications thereof.

10.3.2b Certified Energy Conservation Officer (CECO) or a Certified Energy Manager (CEM)

Designation or hiring of a Certified Energy Conservation Officer (CECO) or a Certified Energy Manager (CEM) according to classification of Designated Establishment (either Type 1: 500,000- 4,000,000 kWh consumption per year; or Type 2: 4,000,000 kWH consumption per year and higher) subject to DOE Guidelines. (Note: DOE has yet to issue guidelines for computing and identification of Designated Establishments.)

The CECO must possess the following qualifications:

- Must have at least two (2) years of continuous hands-on experience in installation, operation, and maintenance of energy-consuming machines and equipment in facilities with energy consumption for Type 1 Designated Establishments.
- Must pass the certification examination and assessment of TESDA prescribed for CECO.

As a continuing qualification, the CECO must undergo energy efficiency and conservation seminars conducted by TESDA, DOE or any third-party institutions duly approved by TESDA.

The CEM must possess the following qualifications:

- Must be a licensed engineer (preferably Electrical Engineer); or a graduate of a four (4) year course or equivalent with at least three (3) years of continuous hands-on experience in the installation, operation, and maintenance of energy-consuming machines and equipment in facilities with energy consumption for Type 2 Designation Establishments, proof of which shall be submitted to the DOE.
- Must pass the certification examination and assessment for the development of the DOE in consultation with the relevant government and industry stakeholders.

As a continuing qualification, the CEM must undergo energy efficiency and conservation seminars conducted by the DOE or any third-party institution duly approved by the DOE.

The CEO and CEM, in their respective designated establishments, shall:

- Manage the energy consumption of facilities, equipment, and devices.
- Administer the following:
    - Implementation and improvement of energy efficiency measures.
    - Conduct of regular energy audit.
    - Energy monitoring and control.
    - Preparation of periodic energy consumption and energy conservation program reports.
- Fulfill other responsibilities as indicated in the Energy Conservation Act and the EEC-IRR.

10.3.3 Energy Conservation

a. The reduction of losses and wastage in various energy stages from energy production to energy consumption through the adoption of appropriate measures that are technologically feasible, economically sound, environmentally-friendly, and social affordable[78].

b. To comply with the Department of Energy (DOE) on Government Energy Management Program under Section 66 of the IRR of the Energy Efficiency and Conservation Act, all types of establishments including hospitals and other HFs shall have the following obligations:
    - Integrate and energy management system policy into the business operation based on ISO 50001 or any similar framework;
    - Set-up programs to develop and design measures that promote energy efficiency, conservation, and sufficiency that may include installation of renewable energy technologies;
    - Set-up annual targets, plans, and methods of measurements and verification for the implementation of energy efficiency and conservation projects;
    - Keep records on monthly energy consumption data and other energy-related data;
    - Improve average specific energy consumption in accordance with the annual reduction targets to be established by the DOE in the National EE&C Plan;
    - Submit an annual energy consumption report and annual energy conservation report online for each facility or establishment to the DOE by the 15th of April of every year. Such reports shall contain the information required by DOE including energy consumption based on the previous year, the designated type, PSIC code, main business activity, address, and the name of CECO or CEM, among others;
    - Conduct an energy audit once every three (3) years by engaging either a certified auditor or an accredited Energy Service Company (ESCO) and submit an energy audit report to the DOE upon completion of the energy audit.
    - Employ a CECO for Type 1 designated establishments, and a CEM for Type 2 designated establishments. The CECO and the CEM may be chosen from within the organization or hired through external recruitment
    - Duly notify the DOE in writing on the appointment or separation from the service of their respective CECOs or CEMs within (10) working days from

[78] Sec. 2 of the Republic Act 11285, Energy Efficiency and Conservation Act

the effectiveness of these personnel actions.

c. Strategies to conserve energy. HFs can significantly minimize their electricity consumption and energy costs through dynamic strategies that do not impede the HFs operations and the needed safety and comfort to deliver healthcare services.

- Efficient Lighting

Based on the Energy Efficient Lightning of Whole Building Guide[79], lighting equipment selection should be based on a balance between the requirements of the design and an effort to limit the number of fixture types and lamp types in order to have reasonable maintenance inventories. Lamp selection is based on efficiency (lumens per watt), color temperature, color rendering index, life and lumen maintenance, availability, switching, dimming capability, and cost. The following are the commonly used energy efficient lamps[80]:

a) Many T8 and T5 linear fluorescent and compact fluorescent lamps are excellent choices for today's buildings because they are energy efficient, have great color rendering properties, long life, and are readily available, easily controllable and very affordable.
b) High frequency electronic ballasts are also important to visual performance because they reduce eyestrain and fatigue. Frequencies in the 20 kHz range and higher provide smooth, non-flickering lamp operation.
c) Electronic ballasts are also responsible for better lamp performance, extending life and improving color characteristics. Luminaires are selected for their lighting effectiveness.

With this, here are some guide but not limited to the following are to be considered for implementing efficient lighting:

- General Lighting unit load for hospitals is 22 Volt-Amperes per square meter[81]
- Use of efficient lighting lamps such as LED, CFL, Slim type Fluorescent and others.
- Use of efficient equipment such as appliances with inverter technology, LED displays and others.
- Utilizing daylight whenever possible.
- De-lamp areas with excessive illumination.
- Revisit the needed lighting for external signs and parking areas.
- Buildings should be planned and designed to maximize the use of natural light to reduce the use of artificial illumination.
- High ceiling can be used to incorporate natural lighting and minimize use of electricity during daytime.
- Use load shedding on lighting systems and other equipment to avoid creating peaks in demand. Turning off lights, computers, appliances, and other equipment when not in use.
- All regularly occupied spaces[82] shall have features (i.e. window, light shelf, clerestory, skylight, or light monitor / light scoop) that can allow daylight into the room space.

[79] Nelson D., Dept. 30, 2016, Energy Efficient Lighting, Whole Building Design Guide
[80] https://www.wbdg.org/resources/energy-efficient-lighting
[81] 2009 Philippine Electrical Code, Part 1, Volume 1, Table 2.20.2.3 General Lighting Loads by Occupancy
[82] Philippine Green Building Code 2015

- The general lighting of any enclosed area 10 m^2 or larger in which the connected load exceeds 10 W/m^2 for the whole area shall be controlled so that the load for the lights may be reduced by at least 50% while maintaining a reasonably uniform level of illuminance throughout the area.
- Lighting controls with automated systems such as motion sensors or night switches can be installed.
- Lamps and lighting systems should have regular cleaning, control and maintenance.

Essential Electrical System and Equipment Use

The essential electrical system for HFs shall comprise a system capable of supplying a limited amount of lighting and power service, which is considered essential for life safety and orderly cessation of procedures during the time normal electrical service is interrupted for any reason. This includes clinics, medical and dental offices, outpatient facilities, nursing homes, limited care facilities, hospitals, and other health facilities serving patients.[83] The branches of the emergency system shall be installed and connected to the alternate power source so that all functions specified for the emergency system shall be automatically restored to operation within 10 seconds of interruption of the normal source.[84]

- Performance, maintenance, and testing requirements of essential electrical systems in hospitals, see NFPA 99-2002, Standard for Health Facilities. For installation of centrifugal fire pumps, see NFPA 20-2002, Standard for the Installation of Stationary Fire Pumps for Fire Protection. For additional information, see NFPA 99-2002, Standard for Health Facilities. 85The essential electrical system shall meet the requirements stipulated in the Philippine Electrical Code.
- Using stairs instead of the elevator when going up or going down one (1) floor.
- Monthly electric consumption report of 2010 up to the present year with the latest copy of electric bill to monitor the changes in the energy use.
- The transformer shall be tested in accordance with relevant Philippine National Standards (PNS) at test conditions of full load, free of harmonics and at unity power factor to ensure efficiency.
- Balancing of loads for achieving efficient engine performances can be done.
- Energy saving features of appliances should be preferred.

Ventilation and Space Cooling

Whole Building Design Guide on the Natural ventilation systems[86], rely on pressure differences to move fresh air through buildings. Pressure differences can be caused by wind or the buoyancy effect created by temperature

[83] 2009 Philippine Electrical Code, Part 1, Volume 1, Essential Electrical System

[84] National Fire Protection Association (NFPA) 99 and the NEC: The Basis for Healthy Electrical System, https://www.ecmweb.com/content/article/20891697/nfpa-99-and-the-nec-the-basis-for-a-healthy-electrical-system

[85] 2009 Philippine Electrical Code, Part 1, Volume 1, Essential Electrical System

[86] Walker, A. August 02 2016, Natural Ventilation, Whole Building Design Guide

differences or differences in humidity. In either case, the amount of ventilation will depend critically on the size and placement of openings in the building. It is useful to think of a natural ventilation system as a circuit, with equal consideration given to supply and exhaust.

- Natural ventilation can be used as an alternative to air-conditioning system, saving 10%–30% of total energy consumption.
- Openings between rooms such as transom windows, louvers, grills, or open plans are techniques to complete the airflow circuit through a building
- Aircon operations are scheduled from 9am to 4pm.
- Keeping the air-conditioned room sealed from air infiltrations.
- Setting the ACU at ―fan mode‖ during lunch break between 12:00 noon to 1:00 pm.
- Placement of colored and reflective devices for internal shading (louvers, curtains) in openings with undesirably high solar profit during the summer (EPTA, 2007).[87]
- Regular maintenance of air conditioning units as prescribed by the equipment maintenance manual.
- Inventory list of lightings, ACUs and other office equipment.
- In a centralized AC system, monitor and sequence chillers to maximize efficiency.
- In non-critical areas, turn-off air conditioning units and fans before patients leave.
- Spaces where excessive height is present can have a reduction in cooling volume with integration of false roofs (EPTA, 2007).
- Optimize the air conditioning system in critical environments such as the operating rooms.
- Refer to Department Circular 2016-04-005 of Department of Energy or latest version entitled Particular Product Requirements: Air Conditioners for minimum energy performance Standard and Energy Efficiency Classification[88].
- Use the inverter technology with Variable Frequency Drive technology component that controls the speed of the motor more efficiently.
- In group of air conditioning, reduction of temperature limit of the condensation water in the condenser and the pressure of condensation (in groups of direct expansion), via a) increase of air supply by fans in the air-cooled condenser or in the cooling tower of the refrigeration system, b) increase of water supply in the cooling tower, c) modification of the operation of the control units for continuous operation of the cooler - condenser and d) removal of condenser nearer to the compressor (reduction of energy needs for pumping (EPTA, 2007).
- For more efficient cooling, room size should be considered in choosing ACU rated capacity. Below table shows the Room Size vs. Aircon Cooling capacity.

[87] Environmental Engineers Consultants (EPTA). Guidelines for Energy Efficiency in Hospitals. 2007. Athens, Greece

[88] DOE Department Circular 2016-04-0025; Annex B.1-AC:2018

Table 4. Air Conditioners for minimum energy performance standard.[89]

Room Size (Sq. m.)	Manufacturer's Equivalent Cooling Capacity Rating (kJ/hr.)	Manufacturer's Equivalent Cooling Capacity Rating (Btu/hr.)	Approximate Rating (HP)
14 to 16	7,385 - 8,440	7,000 – 8,000	¾
19 to 21	9,495 - 10,550	9,000 – 10,000	1.0
25 to 26	12,660 - 13,290	12,000 – 12600	1.5
38 to 40	18,990 - 20,045	18,000 – 19,000	1.5

- HCFs which are capable of Building Energy Management Control Systems (Guidelines for Construction and Equipment of Hospital Facilities, 1992-1993).

    - Random cycling of thermostats based on set-point temperature.
    - Turn equipment time clock on/off at predetermined times.
    - Turn electric equipment off when preset level of electrical usage is reached as demand limiter.
    - Utilize computerized memory to schedule and cycle electrical loads.
    - Combines administrative capabilities with communication functions in the computed integrated systems.
    - Use stand-alone intelligent Filed Interface Devices (FIDs) as sensor inputs in distributed processing control.
    - Use multiple start/stop control for equipment at the designated times. Provisions for holiday scheduling should also be provided.

d. Strategies to Conserve Fuel for Hospital automobile

- Avoid idling of engines while waiting and/or parking.
- Keep tires inflated to the correct pressure. With proper tire inflation, your car will burn less fuel and be safer to drive. A vehicle with tires that are under-inflated by a total of 10 psi increases fuel consumption by 5%.
- Drive the posted speed limit. Lowering your highway cruising speed from 120 km/h to 100 km/h will reduce fuel consumption by up to 20%.
- Use the vehicle aircon only when needed. Operating an air conditioner in hot weather can increase fuel consumption by more than 20% in city driving.
- Park in the shade.
- Anticipate traffic flow. Avoiding trouble spots shortens your travel time and reduces unnecessary idling.
- Avoid uphill speed driving.
- Implementation of Fuel Conservation Program.
- Performing Preventive Maintenance Schedule (PMS) of service vehicles and ambulances.
- Inventory list and assignment of vehicles to an official.
- Monthly Fuel Monitoring Report in 2015 up to the present year.

[89] Department of Energy PowerPoint Presentations during Seminar on Energy Efficiency and Conservation in the Government held at NPC last Nov. 13, 2019; www.doe.gov.ph

- Records of daily entry and dispatch of ambulances and service vehicles from motor pool and trip tickets of each service vehicle.

Energy efficiency requires the adoption of efficient practices, designs, methods and methodologies at reduced energy consumption resulting in cost savings. The provisions of this Green Manual shall apply to all building occupancies with 10,000 sqm. TGFA with no exceptions, except when specifically provided herein.

10.4 Energy Audit in Health Facility

R.A. 11285 or the Energy Efficiency and Conservation Act requires every public or private facility to conduct Energy Audit and submit report to the Department of Energy every three (3) years. This system and operation analysis of the facility may specify on how and where the health facility can save on energy consumption and reduce energy costs.

Based on the ASEAN Energy Efficiency and Conservation Best Practices for Office Building standards, the considered efficient Building Energy Efficiency Index (BEEI) value is equal to or less than 160 kWh/year/m2. For Hospitals, the BEEI is considered efficient if it is equal to or less than 288 kWh/year/m2.

- The energy audit can be done by engaging either a certified auditor or an accredited Energy Service Company (ESCO).
- The report should highlight the analyses made on the energy consuming systems in facilities.
- Findings and recommendations must focus on ways to save energy in lighting system, electrical system, office equipment, and air-conditioning system.
- The documents required by the Energy Auditor are the following:
  - Copy of Special Order/Memorandum designating an Energy Conservation Officer
  - Copy of Office Issuance/Memorandum Circulars regarding energy conservation measures
  - Copy of latest Electrical Bill
  - Copy of latest Monthly Electricity and Fuel Consumption Report from 2010 up to the present year
  - Lighting equipment inventory list with specifications
  - Office equipment inventory list with specifications
  - Air-conditioning units and generator sets inventory list with specifications.
  - Vehicle inventory list (including the date of purchase)
  - Copy of vehicles' preventive maintenance schedule (work order or official receipt as proof)
  - Copy of sample vehicle trip ticket
  - Copy of approved motor pool log book – monitoring of vehicle dispatch
  - Gross floor area of all buildings

10. 5 Building Envelope

Building envelopes physically separates the indoor and outdoor environments. It encompasses the entire exterior surface of a building, including walls, roof, doors, and windows, which close, or envelope, the interior spaces. It is composed of layers

of building materials that protect interior spaces from changes in outdoor weather and climate conditions.[90]

When designing a building envelope in a country like Philippines, there are particular considerations (Building Planning and Massing, 2010) that need to be addressed such as:

- Orientate your building and design your façade to mitigate heat gains. The East and West facades receive the greatest solar radiation, and should be designed to avoid direct sun.
- Use glazing in an effective and efficient manner for views and daylighting. Vertical glazing from the finished floor level (FFL) up to a height of 750 mm does not serve any daylighting or vision purpose. Glazing between 750 – 2,100 mm from FFL is considered 'vision glazing' but has minimal contribution to daylighting. Glazing above 2,100 mm from FFL is considered daylight glazing, and is most effective in harvesting natural light for internal illumination; however, care should be taken to avoid creating glare or visual discomfort.
- Where insulation is applied to wall surfaces, the insulation shall be continuous to prevent heat conduction through the gaps.
- Glass with a lower U-value and Shading Coefficient (SC) reduces solar heat gains. These properties need to be balanced with an appropriate Visible Light Transmittance (VLT), which affects daylighting.
- Consider life span, durability and life cycle-costing when selecting façade materials. An expensive but low-maintenance and durable material may be economical when factored over the building's life.
- Allow provision for easy access for maintenance and cleaning especially for curtain wall systems. This helps to ensure that your façade system will continue to perform at an optimal level.

10.5.a Air Tightness and Moisture Protection

10.5.a.1 General

As the humidity levels are very high in the Philippines, the unwanted infiltration and humidity ingress into the spaces can cause additional load on the air conditioning systems and a detrimental impact on air quality. Buildings must be planned and designed with specific details to ensure that air tightness is maximized. Details should precisely include joints, service entry points, windows and doors. The implementation of these measures requires only increased attention to the construction details and it can be implemented at practically no cost.[91]

10.5.a.2 Applicability and exceptions

This measure applies to all Health Facilities (HFs) design of:

a. Government and Private
b. New building designs; and
c. Any expansion and/or modification of buildings or systems.

[90] Philippine Green Building Code, p. 11

[91] Philippine Green Building Code, Section 10

Except for buildings and spaces without provisions for air conditioning systems.

10.5.a.3 Requirements

Buildings shall be planned and designed with:

- Complete gaskets, weather-stripping, door bottom sweeps and seals within and around window and door assemblies
- Moisture protection on the surface of the external façade to reduce vapor and moisture migration from external spaces.

10.5. b Glass Properties

10.5.b.1 General

Compared to wall assemblies, glazing transfers more heat and hence, it is ideal to reduce the amount of glazing with respect to the wall to reduce internal heat grains. The requirement of Window to Wall Ratio (WWR) needs to be balanced with the amount of daylight coming through the glazed area.

Solar Heat Gain Coefficient (SHGC) is used to determine the amount of solar heat admitted through the glass divided by the total solar radiation incident on the glass.

Visible Light Transmittance (VLT) is used to determine the amount of light transmitted through the glass.

10.5.b.2 Applicability

This measure applies to all HFs (Government-owned and Private-owned)

10.5.b.3 Requirements

WWR shall be balanced with SHGC to maintain flexibility in design. To further describe, the higher the designed building WWR, the lower the required SHGC in glass windows shall be and vise-versa. This does not however, remove the option for HFs to apply windows with low SHGC for buildings with low WWR. The size of the opening (with or without glass) shall be in accordance with the National Building Code of the Philippines.

The SHGC Requirement can be adjusted if sun breakers are provided in the windows. Refer to Section 10.1.2.c.i of the GB Code for the computation of limits adjustment.

Coefficient (SHGC) and Visible Light Transmittance (VLT) for different Window to Wall Ratio (WWR)[92].

[92] Philippine Green Building Code 2015

Table 5. Solar Heat gain

WWR	Maximum SHGC	Minimum VLT
10	0.80	0.80
20	0.70	0.70
30	0.60	0.70
40	0.45	0.60
50	0.44	0.55
60	0.37	0.50
70	0.31	0.45
80	0.27	0.40
90	0.24	0.35

10.6 Natural Ventilation

10.6.1 General

HFs staff, patients and carers are given flexibility and opportunity to use natural ventilation for free cooling and fresh air in regularly occupied spaces. It limits the creation of glass sealed box type buildings.

10.6.2 Applicability and Exceptions

This measure applies to all Health Facilities (HFs) design of:

a. Government and Private
b. New buildings and their systems; and
c. Any expansion and/or modification of buildings or systems.

These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements especially for isolation rooms.

10.6.3 Requirements

a. HFs are encouraged to use natural ventilation. Wider openings such as windows must be considered in new buildings with screens. The size of the opening window shall be equal to at least ten percent (10%) of the floor area of regularly occupied spaces. Air exchange rates must follow the Philippine Green Building Code.

b. All operable windows shall be provided with safety features for protection against strong winds, water penetration and protection for building occupants including child safety and security.

c. For Hospital Setting, specific air exchange rates are usually attained through artificial ventilation. Adequate ventilation throughout the facility contributes to maintaining a hygienic environment. Presence of functional windows and doors, that allow at least 6-8 air changes per hour for natural ventilation. For airborne infection isolation room/s and ER/triage areas, greater or more than

12 air changes per hour is recommended, while up to 15 air changes per hour may be recommended for operating, procedure, or delivery rooms. Air changes coefficients are stated and enforced in in the latest National Standards on Infection Prevention and Control in Health Facilities DOH Manual[93].

d. To reduce utility costs, use energy-conserving measures such as recovery devices, variable air volume, load shedding, or devices to shut down or reduce ventilation of certain areas when unoccupied. Mechanical ventilation should take advantage of outdoor air by using an economizer cycle (when appropriate) to reduce heating and cooling loads.

e. The design of proper, general ventilation systems can play an important role in preventing the spread of infections. To adapt health facilities to natural ventilation, thereby maximizing outbreak preparedness while minimizing costs and emissions. According to WHO there are four design methods available for natural ventilation systems[94]:

Natural ventilation is the use of natural forces to introduce and distribute outdoor air into or out of a building. These natural forces can be wind pressures or pressure generated by the density difference between indoor and outdoor air.

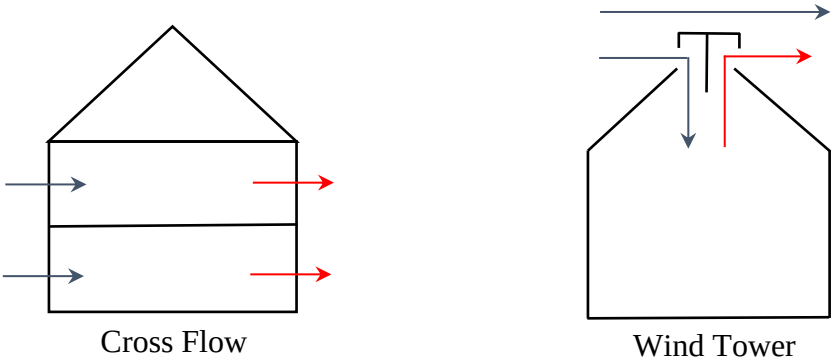
- Cross flow (no corridor) — the simplest natural ventilation system with no obstacles on either side of the prevailing wind (i.e. windows of similar size and geometry open on opposite sides of the building);

- Wind tower (wind catcher/wind extractor) — the positive-pressure side of the wind tower acts as a wind catcher and the negative-pressure side of the wind tower acts as a wind extractor;

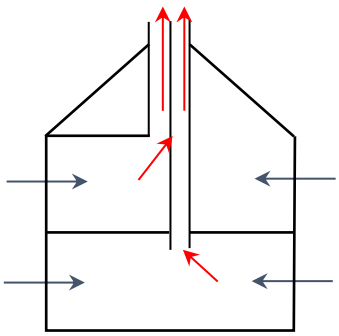
- Stack (or buoyancy), simple flue — a vertical stack from each room, without any interconnections goes through the roof; this allows for air movement based on density gradients;

Stack (or buoyancy), solar atrium — a large stack that heats due to solar radiant loading, which induces air movement due to density (temperature) differentials; without radiant loading, the atrium provides minimal ventilation

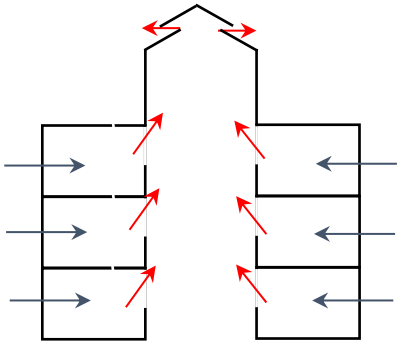
Figure 3. Natural Ventilation



[93] National Standard on Infection Prevention and Control in Health Facilities, Third Edition, 2021
[94] Natural Ventilation for Infection Control in Health-Care Settings 2009



Stack (flue)



Stack (atrium)

f. The specific approach and design of natural ventilation systems will vary based on building type and local climate. However, the amount of ventilation depends critically on the careful design of internal spaces, and the size and placement of openings in the building. Here is some of the recommendations for Natural Ventilation Design[95]:

i. Maximize wind-induced ventilation by siting the ridge of a building perpendicular to the summer winds.
ii. Each room should have two separate supply and exhaust openings. Locate exhaust high above inlet to maximize stack effect. Orient windows across the room and offset from each other to maximize mixing within the room while minimizing the obstructions to airflow within the room.
iii. Window openings should be operable by the occupants.
iv. Provide ridge vents.
v. Allow for adequate internal airflow.
vi. Consider the use of fan-assisted cooling strategies.
vii. Use mechanical cooling in hot, humid climates.
viii. Try to allow natural ventilation to cool the mass of the building at night in hot climates.
ix. Open staircases provide stack effect ventilation, but observe all fire and smoke precautions for enclosed stairways.
x. Determine if the building will benefit from an open- or closed-building ventilation approach.
    a. For consideration, a closed-building approach works well in hot, dry climates where there is a large variation in temperature from day to night. A massive building is ventilated at night, then closed in the morning to keep out the hot daytime air. Occupants are then cooled by radiant exchange with the massive walls and floor.
    b. An open-building approach works well in warm and humid areas, where the temperature does not change much from day to night. In this case, daytime cross-ventilation is encouraged to maintain indoor temperatures close to outdoor temperatures.

10.7 Building Envelope Color

10.7.1 General

[95] https://www.wbdg.org/resources/natural-ventilation

Light-colored building envelopes, especially the roof areas which are the most vulnerable, can reduce heat transfer from the outside to the inside of the building by having surfaces with high Solar Reflectance Index (SRI).

For Health Facility Enhancement Program (HFEP) funded and coordinated health Facilities and medical transport must follow the Administrative Order 2020-0011 entitled Guidelines in the Implementation of the Unified Color, Signage Features, and Design of Identified Interior Spaces for Health Facilities Enhancement Program (HFEP)-funded and coordinated Health Facilities and Medical Transport Vehicles.

10.7.2 Applicability

This measure applies to all HFs (Government-owned and Private-owned)

10.7.3 Requirements

Building metal roof surfaces shall either be colored white or have a minimum SRI of 70.

Table 6. Solar Reflectance Index (SRI) of basic-colored coatings for metal roof surfaces.[96]

Metal Surface	SRI
Reflective white	86 to 92
Basic white	80 to 88
Beige / Tan	74 to 80
Dark brown	0 to 33
Light to medium brown	45 to 56
Light to medium grey	39 to 63
Dark grey	0 to 41
Blue	23 to 30
Light to medium blue	35 to 38
Red	28 to 36
Terracotta red	38 to 40
Green	25 to 32
Light to medium green	30 to 48

10.8 Roof Insulation

10.8.1 General

Insulation can help reduce heat gain in a building thus improving thermal comfort, acoustic quality and reducing the load on the air conditioning system.

10.8.2 Applicability

[96] Philippine Green Building Code 2015

This measure applies to all HFs (Government-owned and Private-owned)

10.8.3 Requirements

Buildings shall be provided with roof insulation so that the average thermal resistance value (R-Value) of the roof is at least R-8.

Table 7. R-Value of Common Roof Insulation[97]

Insulation	R-Value / inch (25.4 mm)
Polyisocyanurate	5.6 to 8.0
Polyurethane	5.6 to 6.5
Closed cell spray foam	5.5 to 6.0
Phenolic foam	4.8
Urea formaldehyde foam	4.6
Plastic fiber	4.3
Mineral fiber	4.2 to 4.5
Cementitious foam	3.9
Polystyrene	3.8 to 5.0
Fiberglass	3.7
Rockwool	3.7
Rigid foam	3.6 to 6.7
Cellulose	3.6 to 3.8
Open cell spray foam	3.6
Sheep‘s wool	3.5
Hemp	3.5
Cotton	3.4
Loose cellulose	3.0 to 3.7
Mineral wool	2.8 to 3.7
Straw	2.4 to 3.0
Vermiculite / Perlite	2.4
Reflective bubble foil	1 to 1.1

10.9 Sustainable energy in health care

a. In energy intensive settings, solar power with battery backup can be provided on-site, such as on the roof of buildings, or covering/shading parking or other areas.
b. Depending on the site features, and local zoning regulations, wind turbines can also be built on-site as well. However, due to the large energy consumption of medium and high complexity health facilities, on-site solar power often is used to supply supplementary electricity or back up power. When it is available, large facilities can purchase renewable energy from their energy provider and gain access to large scale renewable energy sources that are remotely located in areas that optimize the energy provided.

c. To increase the use of renewable energy in health facilities the following strategies are recommended:

[97] Philippine Green Building Code 2015

- Use photovoltaic (PV) solar systems with batteries for on-site renewable energy generation and resilience. Solar photovoltaic systems should be located where they get maximum access to sunlight throughout the year. Typical locations include on the roof of buildings, above parking or on open areas of the site that are not shaded by buildings or vegetation.

- Use wind turbines when appropriate, for on-site renewable energy generation. In-depth wind studies should be conducted to identify and verify the best locations for wind turbines. While some wind turbines can be located on buildings, raising them to have greater access to wind. However, wind turbines can cause vibrations that may be disruptive to health care spaces and sensitive equipment, so vibration studies should be conducted as part of the analysis for determining the best location for wind turbines.

- Where water is abundant, use small-scale hydroelectric power systems. This form uses the gravitational potential of elevated water that was lifted from the oceans by sunlight. It is not strictly speaking renewable since all reservoirs eventually fill up and require very expensive excavation to become useful again. At this time, most of the available locations for hydroelectric dams are already used in the developed world.

- Use off-site power purchase agreements to provide health facilities with renewable power, without encumbering the facility site and to enable the renewable power generation equipment (solar panels, wind turbines, hydroelectric generators, etc.) to be located where the renewable resources (sun, wind, water) are most abundant.

- Minimize electricity consumption by increasing the efficiency electricity consuming equipment, ventilation systems, water pumps, and lighting to maximize the value of the renewably generated electricity

- Biomass is the term for energy from plants. Energy in this form is very commonly used throughout the world. Unfortunately, the most popular is the burning of trees for cooking and warmth. This process releases copious amounts of carbon dioxide gases into the atmosphere and is a major contributor to unhealthy air in many areas. Some of the more modern forms of biomass energy are methane generation and production of alcohol for automobile fuel and fueling electric power plants.

- Hydrogen and fuel cells. These are also not strictly renewable energy resources but are very abundant in availability and are very low in pollution when utilized. Hydrogen can be burned as a fuel, typically in a vehicle, with only water as the combustion product. This clean burning fuel can mean a significant reduction of pollution in cities. Or the hydrogen can be used in fuel cells, which are similar to batteries, to power an electric motor. In either case significant production of hydrogen requires abundant power. Due to the need for energy to produce the initial hydrogen gas, the result is the relocation of pollution from the cities to the power plants. There are several promising methods to produce hydrogen, such as solar power, that may alter this picture drastically.

- Geothermal power. Energy left over from the original accretion of the planet and augmented by heat from radioactive decay seeps out slowly everywhere, every day. In certain areas the geothermal gradient (increase in temperature with depth) is high enough to exploit to generate electricity. This possibility is limited to a few locations on Earth and many technical problems exist that limit its utility. Another form of geothermal energy is Earth energy, a result of the heat storage in the Earth's surface. Soil everywhere tends to stay at a relatively constant temperature, the yearly average, and can be used with heat pumps to heat a building in winter and cool a building in summer. This form of energy can lessen the need for other power to maintain comfortable temperatures in buildings but cannot be used to produce electricity.

- Other forms of energy. Energy from tides, the oceans and hot hydrogen fusion are other forms that can be used to generate electricity. Each of these is discussed in some detail with the result being that each suffers from one or another significant drawback and cannot be relied upon at this time to solve the upcoming energy crunch.[98]

[98] http://www.altenergy.org/renewables/renewables.html

CHAPTER 4

WATER EFFICIENCY, SANITATION & HYGIENE

Chapter 4

Water Efficiency, Sanitation and Hygiene

Green & Safe Health Facilities Manual

Section 11. Water Efficiency

11.1 General

a. Planners, developers and designers should address the problem of dwindling water supply and control water contamination in HFs. For the health service sector, it is high time for medical practitioners, in addition to engineers and architects, to take a closer look at the grim scenario of the water crisis.

b. This section shall come up with standards and guidelines for water efficiency consistent with the applicable green building requirements of the Philippine Green Building Code, the Clean Water Act (RA 9275), the Plumbing Code of the Philippines, (RA 1378), the Code on Sanitation of the Philippines (PD 856), Fire Code of the Philippines (RA 9514), Accessibility Law of the Philippines (BP) 344 and all other related laws.

c. Water is a core element of life. Despite this high coverage of water supply, a lot of Filipinos are still exposed to unsafe water. With the current issues on global warming, climate change, and natural disasters that impact on water quality and health of the Filipino people, an innovative strategy like water safety plan has to be supported by a policy to drive all drinking-water service providers to exert efforts in coming up with the most effective means of dealing with risks that threaten the safe quality of drinking-water and public health.[99]

d. While additional capital and operational investments will be required to implement these new standards, there are anticipated benefits to the health sector through the significant savings that the facilities can provide in conservation of water, optimization of water use, recycling of treated wastewater, and in rainwater harvesting.

e. To lessen the carbon footprints from the health facilities, to make them resilient to climate change impact and promote infection prevention and control, compliance to this Green Manual is enjoined based on the existing laws and regulations.

11.2 Applicability

11.2.1 This measure applies to all Health Facilities (HFs) design of:
- a) Government and Private
- b) New buildings and their systems; and
- c) Any expansion and/or modification of buildings or systems.

11.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

11.3 Requirements

11.3.1 Sufficient Water Supply

a. A water supply from an approved public water supply system or drinking-water service provider whenever available shall be provided. However, other sources may be tapped provided that the water supply has undergone thorough treatment

[99] DOH Administrative Order 2014-0027, National Policy on Water Safety Plan (WSP) for All Drinking-Water Service Providers, September 04, 2014

and analysis to ensure it is safe for human consumption. Water tank shall also be installed if it necessary just to ensure that the water supply required for the efficient function of the facility is maintained[100].

b. Workers in health facilities need sufficient quantities of safe water to provide health care services. Drinking and cooking, hand hygiene, showering and bathing, and a variety of general and specialized medical uses all require a reliable supply of safe water. Water is also essential for cleaning rooms, beds, floors, toilets, sheets and laundry. It is central to patient experiences of health care, as it enables them to remain hydrated, to clean themselves, and to reduce the risk of infections. Families and care-givers also need water to tend to patients and their own needs. Without adequate and safe water supply, a health facility will be difficult to function as one.

c. Different health facilities have different water requirements depending on the type of health services offered and the scale of the facility. The quantity and quality of water available, the location and accessibility of water points within the health facility, and the reliability of the water supply over time, are all important aspects of water services.

Improved water supply for drinking, cooking, and bathing should be available daily within the HFs.

i. It should have sufficient quantity that would meet the requirements for drinking of at least 2 liters/person/day.
ii. It should also meet other water requirements.

Table 8. Minimum water quantities required in the health care setting[101]

Outpatients	5 liters/consultation
Inpatients	40–60 liters/patient/day
Operating theatre or maternity unit	100 liters/intervention
Dry or supplementary feeding center (depending on waiting time)	0.5–5 liters/consultation
Wet supplementary feeding center	15 liters/consultation
Inpatient therapeutic feeding center	30 liters/patient/day
Cholera treatment center	60 liters/patient/day
Severe acute respiratory diseases/isolation center	100 liters/patient/day
Viral hemorrhagic fever isolation center	300–400 liters/patient

iii. In areas where water supply is not sufficient, water dispensers and other water containers, such as jerry cans shall be made available and must be regularly cleaned and subject to random microbiological testing.

iv. Drinking water from water supply providers must comply with the DOH A.O. 2017-0010 –Philippine National Standards for Drinking Water of 2017or its

[100] DOH Administrative Order 2020-0047, Rules and Regulations Governing the Licensure of Primary Care Facilities in the Philippines
[101] Essential Environment Health Standards in Health Care, 2008

latest version. For its own water system, the quality of water intended for drinking should also meet the Philippine National Standards for Drinking Water of 2017 PNSDW. All water supplies intended for drinking, cooking, and bathing shall be subject to water quality testing and regular monitoring as indicated in the Philippine National Standard for Drinking Water of 2017.

d. Development and Implementation of Water Safety Plan (WSP) in Health Facilities to ensure drinking water safety as per DOH AO No. 2014-0027. The WSP concept is a cost effective and preventive strategy that ensures safety and quality of drinking-water. Thus, The DOH will be releasing a guideline that provides a step-by-step process on the formulation of WSP tailored fit on hospital settings which will also serve as a model for other health facilities on the formulation of their own WSPs.

e. Water to be used for medical purposes such as dialysis, shall comply with the AO No. 2013-0003 Implementing Guidelines in the Analysis, Monitoring, and Maintenance of Water Used in Dialysis Facilities pursuant to AO No. 2012-0001 known as New Rules and Regulations Governing the Licensure and Regulation of Dialysis Facilities in the Philippines.

f. Water used for laundry and for cleaning floors and other surfaces need not be of drinking-water quality, as long as it is used with a disinfectant or a detergent.

11.3.2 Safe Drinking-Water Supply

The Code on Sanitation of the Philippines of 1975 (P.D. 856) mandates the DOH to promulgate rules and regulations for the proper implementation and enforcement of the Code, including provisions on drinking-water supply, among others.

Sections 3.a, 3.d and 9 contain provisions on drinking-water safety which states that: The Department of Health shall:

i. Undertake the promotion and preservation of the health of the people and raise the health standards of individuals and communities throughout the Philippines;

ii. Upgrade the standards of medical practice, the quality of health services and programs to assure the people of better health services;

iii. Quality of Drinking and/or Potable water shall conform to the latest Philippine National Standards for Drinking Water (PNSDW) of 2017. The treatment of water to render it safe for drinking and the disinfection of the contaminated drinking water sources together with their distribution systems shall be in accordance with procedures set by the Department of Health."

11.3.3 Alternative Water Source

a. Each health service facility has unique characteristics, and thus, the application of the standards will be, to a degree, site-specific. However, regardless of the layout, the size, and the ownership of the facility (public or private), the standards must include efficient water storage and distribution, water fixtures with water saving features, management controls like sub-metering, water pressure regulations, and treated wastewater and rainwater

storage tank installation. Proper operation and maintenance practices shall be applied.

b. Installation of Rainwater Collection System[102] (RWCS) shall be installed in government buildings and sites as an adaptation measure to combat climate change and to ensure sufficient water supply, which shall be in accordance with the prescribed design of DPWH. In no case shall the RWCS be constructed in private lots or privately-owned or operated market places.

c. Beyond the standards, developers must consider the various wastewater treatment options for HFs. The latest version of the DOH Health Care Waste Management Manual shall serve as the main reference.

11.3.4 Water Discharge

- All wastewater of HFs should be treated before disposal to any bodies of water or drainage in accordance with DENR Administrative Order No. 2016-08, Water Quality Guidelines and General Effluent Standards of 2016 and shall comply with the requirements of wastewater treatment indicated in the 4th edition of DOH Health Care Waste Management Manual or the latest. Wastewater should be safely managed through use of on-site treatment (i.e. septic tank followed by drainage pit) or sent to a functioning sewer system.

- In using treated wastewater, the health and safety of users must not be compromised. The treated wastewater shall not be used for activities with human contact but can be used in watering the plants or in flushing toilets.

- Water used for laundry and for cleaning floors and other surfaces need not be of drinking-water quality, as long as it is used with a disinfectant or a detergent.

- Wastewater should be removed rapidly in a sanitary manner from the point where it is produced. Wastewater drainage from health-care settings should be properly installed and managed to avoid contamination of the health-care setting or the broader environment. HFs are required to have a required Wastewater Treatment Facility under RA 9275 – Philippine Clean Water Act of 2004.

- Rainwater and surface run-off should be safely disposed of and does not carry contamination from the health-care setting to the outside surrounding environment. Rainwater is harvested and used as a non-potable water supply on water closets and urinals.

11.3.5 Water Management and strategies

- Maintain or keep the desired quality of water for its intended specific application or usage. If water is to be used for cooking, bathing, and drinking only, it should comply with the DOH-AO 2017- 0010 - Philippine National Standards for Drinking Water of 2017 or its latest version.

- Harvest rainwater and reuse treated wastewater for domestic purposes such as watering of plants, cleaning of ambulances/service vehicles, toilet flushing, and others.

[102] Sec 28 of RA 11260, General Provisions of General Appropriations Act 2019

- Reduce water loss by repairing broken piping and leakages, and operate and maintain an efficient water system, from collection and storage to distribution system.
- Label water pipelines with color-coding for guidance and warnings.

- Practice proper water management to maximize the efficient use of water. An example is the installation of water meters/sub-meters to measure and monitor consumption for evaluation purposes.

- Utilize available water sources, apart from what the water provider can supply. Alternative water sources may generate considerable savings considering that hospitals are charged by water supply providers with expensive commercial rates.

- Protect groundwater resources. Over-pumping of groundwater may also diminish the water supply and likewise result in saltwater intrusion, particularly in coastal regions.

- Educate all stakeholders and hospital personnel of the different water programs.

- Provide HFs with safe drinking water guaranteed for at least 72 hours in case of emergencies. In addition of the 3-day water reserve[103], rain water harvester can be installed with a minimum capacity of one (1) day reserve. Meanwhile, a minimum of 24 hours or less if a tank does not exist and sufficient water is guaranteed to cover at least 72 hours.

11.4 Water Audit

Water Audit is the qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. It is possible to reduce water usage by 10-30% by implementing simple conservation measures[104]. The following are for consideration of water audit:

i. Ensure that HF staff, patients and carers have the responsibility for the efficient and effective use of water.
ii. Designate the EEC officer or other relevant staff to conduct Internal Water Audit regularly and identify other means of saving water. This should include monitoring and recording the volume of water consumed and noting the various uses of water at the HF.
iii. Consider Formal Water Audit, in particular to the hospital and other HF where water is being used. Submetering each HF building can assist in identifying leaks within the various supply pipes.
iv. Elements of water audit must record the following but not limited to:
    - Amount of water produced
    - Amount of water delivered to metered users
    - Amount of water delivered to unmetered users
    - Amount of water loss (balance of water, including leaks)

General steps for conducting a water audit are as follows:[105]

[103] Hospital Safety Index Guide for Evaluation 2nd ed., WHO and PAHO 2019

[104] https://www.slideshare.net/indiawaterportal/water-audit-presentation

[105] O'Malley, M. et al, 2013, Guidance for Preparing Water Audits and Water Loss Reduction Plan, https://mde.state.md.us/programs/water/waterconservation/Documents/www.mde.state.md.us/assets/document/water_cons/Water_Audit_guidance.PDF

1. Set an evaluation period –usually the previous calendar year
2. Modify the attached worksheet provided in Appendix A, if needed, to meet the system's needs
3. Compile water production (if relevant), water purchased (if any), and sales (metered) data
4. Make adjustments to the metered amounts, as necessary
5. Complete the summary sheet provided in Appendix B for submission
6. Determine whether water loss exceeds 10% of the total amount produced. If so, follow up by developing a water loss reduction plan.

11.5 Water-Efficient Plumbing Fixtures

Water-Efficient Plumbing Fixtures are technologies that use less water to perform the same function of cleaning as effectively as standard models.

Table 9 shows the water fixtures performance requirement. Where the recommended minimum water pressure is 20 psi, while the optimum water pressure is 40 psi and the maximum water pressure is 60 psi.

Table 9. Water Fixtures Performance Requirement[106]

Type of Fixtures	Flow Rate	
Dual Flush Water Closet	≤ 6 full 3 low	liters/flushing cycle
Single Flush Water Closet	4.9	liters/flushing cycle
Shower	≤ 9	liters/min
Urinals	≤ 1	liters/flushing cycle
Lavatory taps	≤ 4.8	liters/min
Kitchen faucets	≤ 4.8	liters/min
Handheld bidet sprays	≤ 4.8	liters/min

Section 12 Water, Sanitation and Hygiene (WASH)

12.1 General

a. WASH in health facilities (HFs) is a fundamental prerequisite for achieving national health goals and Sustainable Development Goals (SDGs) 3 - Ensure healthy lives and promote well-being, and 6 - Ensure availability and sustainable management of water and sanitation. Safe drinking-water, functioning handwashing facilities, adequate sanitation and hygiene facilities and proper cleaning practices are especially important for improving health outcomes linked to maternal, newborn and child health, as well as in carrying out basic Infection

[106] Essential Environment Health Standards in Health Care, 2008

Prevention and Control (IPC) procedures necessary to prevent all types of diseases caused by microbial pathogens, including Antimicrobial Resistance (AMR).

b. In 2019 the Joint Monitoring Program on Water and Sanitation of WHO and UNICEF published harmonized baseline estimates for water, sanitation, hand hygiene, health care waste management, and environmental cleaning services in HFs. The global baseline report found that one in four health facilities (26%) lacked basic water services, while one in five (21%) had no sanitation services.

c. Universal health coverage can only be achieved when all HFs have access to fully functioning basic Water, Sanitation and Hygiene (WASH) services that are indispensable in providing quality care, infection prevention and control (IPC) practices, and environments that respect the dignity and human rights of all care seekers.[107]

d. To improve WASH in HF, provide quality of care and reduce infections, HFs must have the appropriate infrastructure and staff capacities to provide safe, effective, equitable and people-centered services. WASH services strengthen the resilience of health care systems in preventing disease outbreaks, allow effective responses to emergencies including natural disasters and outbreaks and bring emergencies under control when they occur.[108]

f. The World Health Assembly in 2019 approved the Resolution on WASH in HFs. It highlighted the importance of addressing basic requirements ensuring structures are in place to sustain WASH services, engaging and empowering cleaners, and the pressing need to address the spread of pathogenic organisms and AMR through WASH and IPC in HFs.

g. This section shall come up with standards and guidelines for WASH consistent with the applicable green building requirements of the Philippine Green Building Code, the Clean Water Act (RA 9275), the Plumbing Code of the Philippines, (RA 1378), the Code on Sanitation of the Philippines (PD 856), Accessibility law of the Philippines (BP 344) and all other related laws.

h. This section of the Green Manual shall be consistent with the provisions of DOH Administrative Order No. 2019-0054, Guidelines on the Implementation of the Philippines' Approach to Sustainable Sanitations (PhATSS) issued on November 15, 2019. The guideline supports LGUs in ensuring sustainable sanitation services are available in various settings including health facilities. Local governments starting at the barangay level go through a verification system to certify their achievement of providing access and meeting the standards for water and sanitation services in various public institutions – schools, ECCd centers, health facilities; and other public spaces (transport terminals and markets). PhaTSS enjoins LGUs to create an enabling environment that fosters a sustainable sanitation program in communities, to increase access to affordable and appropriate sanitation supplies and services, and to mainstream climate change adaptation and disaster risk reduction management.

i. The Philippines ranks third among the countries most at risk from both natural hazards and human induced disasters (World Risk Index, 2018). Water, sanitation,

[107] WASH Services in Health facilities for COVID-19 Response, WHO. 2020

[108] Water and Sanitation for Health Facility Improvement Tool (WASH FIT), 2017

and hygiene (WASH) conditions worsen in emergencies and disasters owing to the disruption, damage or loss of facilities and services. Lack of safe drinking water supply will cause potential outbreaks of vector and water-borne diseases such as cholera, and typhoid fever and lack of proper sanitation management, compounded by increased vulnerabilities from lack of adequate food and shelter, displacement, and overcrowding evacuation centers, create new threats during disaster situations.[109]

12.2 Applicability

12.2.1 This measure applies to all Health Facilities (HFs) design of:

a. Government-owned and Private
b. New buildings and their systems; and
c. Any expansion and/or modification of buildings or systems.

12.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

12.3 Requirements

a. Availability of sustainable WASH services is essential to quality of care and infection prevention and control in HFs. The linkage between safe water for hygiene and hand washing in health facilities and reduction in disease transmission has long been established. Given the importance of water availability and good hygiene during childbirth, WASH is considered both a precondition and an entry point for good quality of care.[110]

b. Sanitation and hygiene are critical to health, survival and development. Safe sanitation is a human right. Sanitation services in HFs are essential to deliver high quality care that improves the health, welfare and dignity of patients and staff and improves health outcomes. Feces are the principal source of pathogenic organisms like bacteria, viruses and parasites that cause diarrheal diseases (including cholera and shigellosis) as well as many other infectious diseases. People who are sick shed many more pathogens in their feces than healthy people.

c. Developing a Sanitation Safety Plan (SSP)[111] will guide to facilitate drafting and implementation of health risk assessment and management plans along the sanitation chain to meet the Sustainable Development Goal 6 (SDG 6) – to ensure the availability and sustainable management of water and sanitation for all. SSP will ensure safely managed and safely treated wastewater.

d. People seeking care in HFs often have weakened immune systems and are particularly vulnerable to infection by fecal pathogens. Health care workers can also be put at risk of exposure to fecal pathogens in the workplace. Proper management of excreta in health care by providing sufficient number of toilet facilities is particularly important to ensure fecal pathogens do not contaminate the HF environment or surrounding areas.

c. Hygiene is an essential element of health care workers' functions since they care for multiple patients and may come into contact with blood and other bodily fluids.

[109] DOH Administrative Order 2020-032, National Policy on Water, Sanitation, and Hygiene (WASH) in Emergencies and Disasters, July 22, 2020
[110] WHO Framework for Green, Low-Carbon, Climate Resilient Health Facilities (Working Draft, 2019)
[111] Guide in Developing Sanitation Safety Plan, WHO (Drafted 2017)

Similarly, visitors to health facilities can also spread pathogens particularly on their hands, and it is important that HFs provide handwashing facilities with soap and water at toilets used by patients as well as other visitors who may be tending to patients' needs.

d. Promote and reinforce good hygiene practices among affected populations through the provision of hygiene supplies, access to WASH facilities, proper use as well as maintenance of WASH facilities, and the conduct of behavior change campaigns that account for local contextual factors, including language and local customs.[112]

e. Interventions to improve hand hygiene in health care settings focus on engaging facility leaders and frontline staff, educating health care workers, displaying reminders on posters and improving communications, monitoring practices and providing feedback, ensuring that health care workers have easy access to soap and water, and/or alcohol-based hand rub (ABHR), and above all know how to use them effectively.

f. The five (5) key moments for hand hygiene in HFs promoted by WHO can be considered, such as: (1) before touching a patient, (2) before clean/aseptic procedures, (3) after body fluid exposure/risk, (4) after touching a patient, and (5) after touching patient surroundings.

12.4 Water and Sanitation for Health Facility Improvement Tool **(WASH FIT)**

Without adequate attention to water, sanitation, and hygiene (WASH), universal health coverage will be difficult to attain.[113]

WASH FIT is a risk-based approach for improving and sustaining WASH services in health facilities. WASH FIT was adapted from the water safety plan (WSP) and sanitation safety planning (SSP) approach recommended in the WHO Guidelines for Drinking Water Quality and WHO Sanitation and Health Guidelines. WASH FIT is a multistep, iterative process to facilitate continuous improvements in WASH services, quality, and experience of care.

Figure 4. Coverage of WASH FIT

The WASH FIT covers four broad areas namely, (1) water, (2) sanitation including health care waste management, (3) hygiene including hand hygiene and environmental cleaning, and (4) management. Each area includes indicators and targets for achieving minimum standards for maintaining a safe and clean environment.

Recognizing the value of WASH FIT[114] in systematizing and harmonizing assessments and improvements of WASH in HFs, the localized version of WASH FIT has been developed with the objective of better aiding the

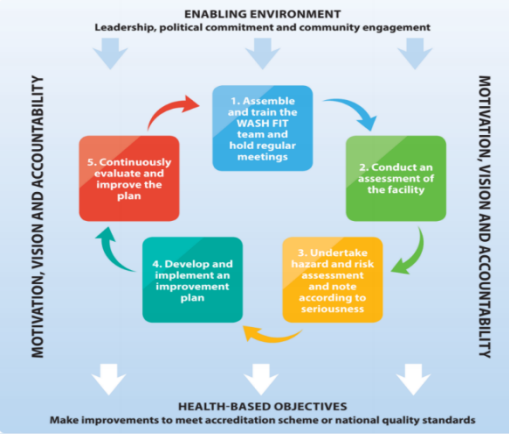
[112] DOH Administrative Order 2020-0032, National Policy on Water, Sanitation, and Hygiene (WASH)in Emergencies and Disasters, Annex 2

[113] Water and Sanitation for Health Facility Improvement Tool (WASH FIT). Geneva: World Health Organization; 2017. License: CC BY-NC-SA 3.0 IGO.

[114] Draft Operational Manual on Water and Sanitation for Health Facility Improvement Tool (WASH FIT)

Philippine health sector by taking into account the relevant local context. The DOH will also be releasing a separate issuance entitled Operational Manual for Water and Sanitation for Health Facility Improvement Tool (WASH FIT).

Figure 4.1. The WASH FIT Process consists of the five task that must be done sequentially



The Philippine version of WASH FIT (can be accessed through this link https://enketo.ona.io/x/hvztbGc7), which the DOH will release another issuance to comply and implement these indicators in HFs.

This has been modified to follow the national standards on WASH for various health facility settings, including the infection prevention and control measures for COVID-19 and other emerging diseases. The Philippines' WASH FIT uses a digital platform with a suite of tools to allow staff and health facility managers offline access on the WASH self-assessment form and a real-time online dashboard for quick analysis. Through seamless digital consolidation of data coming from across all health facilities, national and local governments can easily monitor the status of WASH services and aid them in mobilizing resources to support the improvement plans of health facilities.

12.4.1 Adapting WASH FIT for HFs setting[115]

WASH FIT is primarily designed to be used in primary care facilities that provide outpatient services, family planning, antenatal care, maternal, newborn, and child health services (including delivery). But it can also be adapted for use in any type of HF by modifying the tool to suit their needs to meet quality improvement cycles and mechanisms implemented to improve quality care. However, the broad process and methodology of the WASH FIT should remain the same.

To make the best of WASH FIT in different HF types, the following are recommended:

a. Indicators may be modified to reflect the priorities and standards to be followed.
- Indicators that are not relevant to the facility can be removed.
- Additional indicators may be added as necessary, to represent a higher level of service and/or to cover services provided in larger facilities.
- The indicators can be inserted into existing service assessments and monitoring mechanisms used in the facility (e.g., IPC) to make it more doable and less daunting to the team.

b. Revise assessment design depending on the capacity and/or size of the HF.
- With the limited capacity of primary care facilities and a small budget for improvements, it is more advisable for the facility to focus only on one domain rather than trying to monitor and improve all areas of the facilities at once. The facility must determine which domain (e.g., health care waste) may be

[115] Draft Operational Manual on Water and Sanitation for Health Facility Improvement Tool (WASH FIT)

prioritized. Once the WASH FIT process is established and the staff feels more confident, WASH FIT can be expanded to address other domains.

- In larger facilities such as hospitals, the assessment can be done by service area (e.g., outpatients, delivery room), wards, or departments rather than by domain. Streamlining the assessment can help the team in covering all relevant indicators for a given service area, ward, or department in one go.

12.5 Environmental cleaning

a. Environmental contamination has a significant role in the transmission of healthcare associated infections (HCAI). Some of the pathogens associated with HCAI can survive for months on surfaces such as bed rails, tables and floors. Effective environmental cleaning is a basic intervention for infection prevention and control (IPC). It has shown substantial reduction in the transmission of HCAI. Environmental cleaning refers to the cleaning and disinfection (when needed) of environmental surfaces (e.g. bed rails, call buttons, chairs) and surfaces of non-critical patient care equipment (e.g. IV poles, stethoscopes). It also includes the cleaning and disinfection of floors and bathrooms, and the management of spills of blood and bodily fluids.

b. Environmental cleaning requires products such as cleaning tools (e.g. cleaning cloths and wipes, mops, buckets) and cleaning materials (e.g. detergents, disinfectants) as well as personal protective equipment for the cleaning staff. To make environmental cleaning effective, there should be access to adequate quantities of clean water. Different products and materials should be used for different types of cleaning, including routine cleaning conducted on a regular basis, terminal cleaning conducted after patient discharge, and responsive cleaning following specific events, such as spills of blood or bodily fluids.

c. Written protocols or standard operating procedures (SOPs) should be developed that specify the tools and materials that should be used for each type of cleaning and provide step-by-step instructions on the process. SOPs should describe preparatory steps, including the use of personal protective equipment, and final steps, such as the management of soiled cleaning supplies.

12.5.2 Policies and Standard Operating Procedures (SOP) on environmental cleaning

- SOP on environmental cleaning must be available so that the assigned health care workers will have a guide to be effective on their functions. Environmental cleaning policies should clearly identify who is responsible for which types of cleaning and establish requirements for foundational and refresher training for all staff with cleaning responsibilities.

- All HFs should establish environmental cleaning policies that describe the required type and frequency of cleaning for different purposes, who is responsible for doing the cleaning, and how cleaning should be performed and recorded.

- The HFs must not set aside the importance of green cleaning in WASH. The concept of green cleaning which refers to using cleaning methods and products with environmentally friendly ingredients, and procedures are designed to preserve human health and environmental quality[21]. HF operators must consider green cleaning echniques and products to avoid the use of which contain toxic chemicals and emit volatile organic compounds causing respiratory, dermatological and other

conditions. If the manufacturing process is environmentally friendly and the products are biodegradable, then the term "green" or "eco-friendly" may apply.

- This section of the Green Manual must be consistent with the provisions of Administrative Order No. 2019-0054 – Guidelines on the Implementation of the Philippines Approach to Sustainable Sanitation (Phots) issued on November 15, 2019. The AO contains specific guidelines for Phots levels as the basis for LGU sanitation programming. The Phots implementing mechanism in creating an enabling environment towards a sustainable sanitation program, increasing access to affordable and appropriate sanitation supplies and services, and mainstreaming climate change action and Disaster Risk Reduction and Management (DRRM) can also be applied in health facility settings.

The health facilities must also comply with the requirements of DOH-AO No. 2019-0047 – National Standard on the Design, Construction, Operation and Maintenance of Septic Tank Systems. If the HF will avail the services of septage management system, the requirements in the Supplemental IRR of the Sanitation Code (Chapter 17) must be complied.

12.6 Comfort Station

12.6.1 Toilet facilities

a. For hospitals, there must be at least one water closet for every 8 patients in compliance with RA 4226 –Hospital Licensure Act.
b. Wards shall observe segregation of sexes. Separate toilets shall be maintained for patients and personnel, male and female, with a ratio of one (1) toilet for every eight (8) patients or personnel.
c. Health Facilities shall also comply with the plumbing fixture requirements stipulated in the Plumbing Code of the Philippines
d. For General administrative and Public Areas of the Primary care facilities:

- For the Main Lobby, conveniently accessible toilets for the public. Provision of one (1) toilet for every eight (8) patients shall be applied. A separate toilet for male and female is preferred, and shall be PWD-accessible. And, a separate toilet for the staff, with a provision of one (1) toilet for every fifteen (15) personnel shall be applied.
- For Ancillary Services Area/s, access to toilet and waiting area.

e. There should be sufficient toilet facilities available:

- One per 20 users for inpatient settings
- At least four toilets per outpatient setting (one for staff, and for patients: one for females, one for males and one for PWDs)
- Toilet facilities should have provisions for people with disability (PWD), pregnant woman and elderly,
- In case of common toilets, it must cater to their needs
- Bidets in every toilet must be considered.
- There should be available hand soap.
- Separate water closets must be provided for staff.
- There must be a water closet provided for male, female, PWD in public areas such as OPD and waiting areas within the premises of the HFs.
- Urinals must be provided for male toilets.

- Toilet facilities should be easily accessible (that is, no more than 30 meters from all users) and lockable by the user.

12.6.2 Handwashing Facilities/Lavatories

a. There should be sufficient, and functional, handwashing facilities to ensure health care workers, caregivers and patients can carry out hand hygiene at all five key moments of Hand hygiene and proper handwashing technique.
b. Lavatories with clean water and/with soap must be provided.
c. Hands-Free Faucets must be provided at operating rooms (OR), delivery rooms (DR), dental clinic, emergency department (ER) and clinical laboratories.

12.6.3 Bathroom

a. At least one shower is available for 40 users in in-patient settings (users include patients, staff and carers staying in the health care setting).
b. Bathrooms must be provided in special areas, such as doctors and nurses quarters, staff quarters and at the decontamination area.
c. There should be at least one shower room per birthing facility.
d. Provision for emergency showers, as required in areas such clinical laboratories.

12.6.4 Sink

a. There must be a separate sink for washing, rinsing and preparation at the dietary area.
b. Three compartment sinks must be provided at the dietary area.
c. Sink must be provided at the pantry.
d. Slop sink must be provided in the ward toilet areas
e. Grease traps must be provided in the dietary area.
f. Centralized grease trap must be provided.

12.6.5 Sanitary Installations

a. Sanitary/ sewage line shall be connected to the wastewater treatment facility. In areas where there is available sewerage system it can be connected directly.
b. Cold and hot water lines must be provided in the dietary area and other areas in the HFs as recommended by the HF management.
c. Storm drainage line with a catch basin must be provided and separated from the sewage line.

CHAPTER 5

HEALTH CARE WASTE MANAGEMENT

Chapter 5

Health Care Waste Management

Green & Safe Health Facilities Manual

Section

Section 13. Sustainable Health Care Waste Management

13.1 General

a. The general categories of HF wastes are general waste and hazardous waste. Health care wastes must be properly handled due to many potential hazards in dealing with these wastes such as physical, chemical and biological as well as ergonomic factors. Exposure to hazardous health care waste can result in diseases or injuries, this is due to the following characteristics: it contains infectious agents, genotoxic, hazardous chemicals or pharmaceuticals, radioactive, and sharps.

b. Hospitals around the world are facing problems in the process of becoming a sustainable environment, and evidence indicates that developing countries are incurring more barriers in this field. One of the main barriers is the lack of necessary infrastructure in hospitals to handle hospital waste disposal[116]. Green hospital points to a hospital that sees the environment as part of their quality service. It includes characteristics such as strategic location, efficient use of water, energy and air pollution, and the use of fine materials. It can produce other products, keep indoor quality, and provide good food and green environment as well. It has orientation for green products, non-toxic environment, green cleaning, and reduction of waste and provides a healing garden[117] .

c. Healthcare industry will influence the health of the environment by producing more than 2.4 million tons of waste annually[118] [119]. The health sector is also a significant source of pollution through the products and equipment they use, the resources it consumes and the waste it generates. In addition to climate impacts, health facilities also contribute to a range of other environmental health problems related to chemicals used in health care settings, and waste generated by facility operations.[120]

d. Health care waste management is important due to the following reasons: to ensure the protection of the public health and environment, utilize environmentally sound methods that maximize resource conservation and recovery, ensure the proper segregation, collection, storage, transport, treatment and disposal of solid wastes through the formulation and adoption of the best environmental practice in ecological waste management, excluding incineration.

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[116] Azmal, M., et al, Going toward Green Hospital by Sustainable Healthcare Waste Management: Segregation, Treatment and safe Disposal, November 3, 2014

[117] Suwasono, E., Suman, A. and Yanuwiadi, B. (2013) Creating a Green Hospital Concept through the Management of Non-Medical Waste. International Journal of Advances in Engineering & Technology

[118] Farzianpour, F., Hosseini, S.H. and Hosseini, S. (2014) Global Change and Human Health. 2nd International Congress on Energy Efficiency and Energy Related Materials Libery Hotels Lykia, Oludeniz, 16-19 October 2014, 365. www.enefm2014.org

[119] Azmal, M., et al, Going toward Green Hospital by Sustainable Healthcare Waste Management: Segregation, Treatment and safe Disposal, November 3, 2014

[120] WHO Framework for Green, Low-Carbon, Climate Resilient Health Facilities (Working Draft, 2019)

e. The HFs incur expenses in handling wastes such as plastic liners, waste bins, tipping fee, treatment, disposal and PPEs, hence there is a need to minimize the volume of wastes generated in the HFs. The hospital and other HFs are encouraged in using reusable packaging and start to minimize the volume of waste upon entry to their facility. They must use environmentally friendly and compliant to green procurement in preparing the specifications of their supplies, materials and equipment.

f. The DOH Department Memorandum 2019-0280[121] entitled Establishment of Green Public Procurement (GPP) System in the Health facility encourages the promotion and implementation of GPP System as stated in the aforementioned GPPB Resolution No. 15- 2013[122]. In encouraging the GPP System, the DOH also promotes the adoption of green technical specifications, sustainable consumption and production, green economy and sustainable development, and green, safe, and/or Climate Smart health facilities.

g. Groups of people who are exposed to health care wastes are potentially at risk especially the health care workers, patients, visitors, caregivers, personnel and workers providing support services, as well as persons transporting the hazardous health care wastes. Thus, the health facilities must buy green products such as items listed in the administrative order. In addition, the health facilities must be compliant to DENR-AO 2000-02 dated Jan. 6, 2000 or the Chemical Control Order (CCO) for Asbestos. It is the intention of this CCO to control and regulate the use of asbestos and asbestos containing products.

h. Significant to the DOH Department Circular No. 2020-0191[123] entitled Circulation of the Health Care Waste Management Manual 4th edition shall serve as the most comprehensive set of guidelines on the safe management of waste generated from health care activities in the country. This incorporates the requirements of all Philippine laws and regulations governing HCWM and is designed for the use of individuals, public and private establishments, and other entities involved in segregation, collection, handling, storage, treatment, and disposal of waste generated from health care activities.

i. While the hospital personnel are at greater risk of infection through injuries from contaminated sharps, other hospital workers and waste management operators outside of the health care establishment are also at risk. Certain infections, however, spread through media or caused by more resilient agents, may pose a significant risk to the public.

13.2 Application

13.2.1 This measure applies to all Health Facilities (HFs) design of:

[121] DOH Department Memorandum 2019-0280, Establishment of Green Public Procurement (GPP) System in the Health facility, July 4, 2019

[122] GPPB Resolution No. 15-2013, "Approval to Support the Implementation of Sustainable and/or Green Public Procurement Regime in Government" (Government Procurement Policy Board, May 10, 2013

[123] DOH Department Circular 2020-0191, Circulation of the Health Care Waste Management Manual 4th Edition, April 23, 2020

a. Government-owned and Private
b. New buildings and their systems; and
c. Any expansion and/or modification of buildings or systems.

13.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

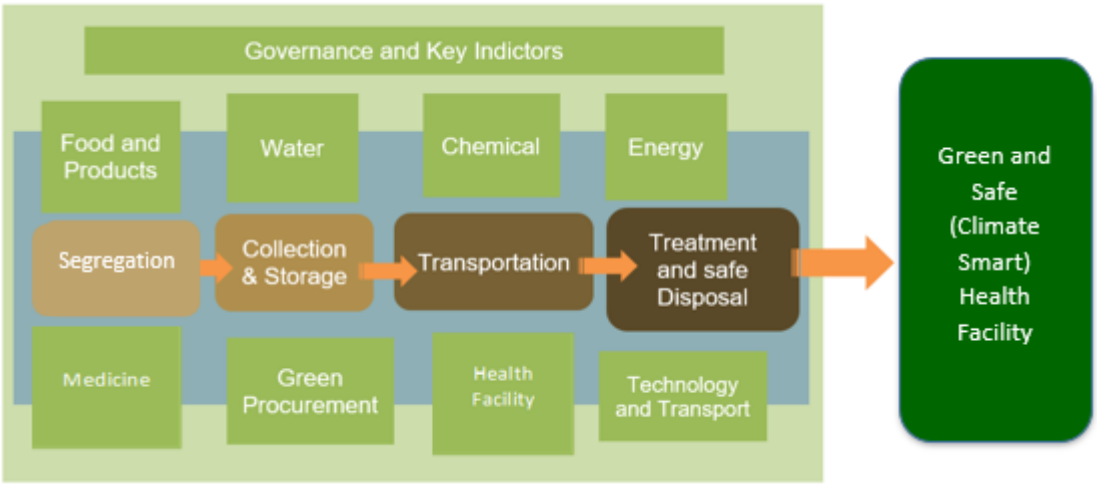
13.3 Requirements

13.3.1 Sustainable Health Care Waste Management

In achieving Green and Safe Health Facility (HF) goals, sustainable healthcare waste management plays a basic role hence attention to other aspects as well. To promote the Green and Safe HF concept, governance is essential at all levels. This means that governance and key performance indicators make clear key priorities of the organization and environmental health, and safety and sustainability towards Green and Safe HF.

a. Green and Safe HF has various aspects with a lot of capacities and capabilities to improve with the implementation of standard and guidelines to achieve the objectives of a safe and sustainable health care management. HF are strongly dependent on the non-structural components like water and energy for their various activities. Considering the effects of climate change and disaster, it is recommended that all areas must be evaluated. Healthcare systems can play an important role in reducing drug wastes by decreasing excessive drug prescription, minimizing improper disposal of pharmaceutical wastes and banning free sale of drugs. Buildings in their current design are similar to boxes that turn resources into wastes. The problem should be solved in the context of sustainability. Surely a way to achieve this goal is to design and build a green and safe HF or designing and creating performances that reduce negative effects on the environment.

Figure 5. Green and Safe HF towards Sustainable HCWM[124]



[124] Azmal, M., et al, Figure 2 of going toward Green Hospital by Sustainable Healthcare Waste Management: Segregation, Treatment and safe Disposal, November 3, 2014

b. Establishing Green Public Procurement Policy can play a central role in implementation of Green and Safe HF goals. Also, Medical Control can positively impact the Green and Safe HF towards Sustainable HCW Management, which includes Patient Safety and Occupational Health and Safety.

c. Hospitals and other health facilities should aim to establish a formal waste management plan. DOH Health Care Waste Management Manual 4th Edition contains the combined knowledge and decisions for all involved in the production, handling and treatment of wastes[125].

d. The treatment of infectious medical HCW, particularly sharps, infectious, and pathological wastes, consists of combustion, autoclaves, microwave disinfection system, chemical, and controlled and healthy landfills. The minimum treatment required for the HCW is disinfection. Some of the most commonly used treatment technologies of HCW can be found in Chapter 8 of the Part II – Health Care Waste Management System of the Health Care Waste Management Manual 4th edition.

e. A Health Safety and Management Plan shall be prepared as a guide for risk management for all types of wastes in health facilities. Hazardous health care wastes[126] such as pharmaceuticals, toxic chemicals, hormone disruptors, anti-microbial resistant residue, and other infectious materials shall be treated prior to release into the environment.

f. The final choice of treatment system should be made carefully, on the basis of various factors, many of which depend on local conditions[127]
   - disinfection efficiency;
   - health and environmental considerations;
   - volume and mass reduction;
   - occupational health and safety considerations;
   - quantity of wastes for treatment and disposal/capacity of the system;
   - types of waste for treatment and disposal;
   - infrastructure requirements;
   - locally available treatment options and technologies;
   - options available for final disposal;
   - training requirements for operation of the method;
   - operation and maintenance considerations;
   - available space;
   - location and surroundings of the treatment site and disposal facility;
   - investment and operating costs;
   - public acceptability;
   - regulatory requirements.

[125] DOH Department Circular 2020-0191, Circulation of the Health Care Waste Management Manual 4th Edition, April 23, 2020

[126] Sec.7 of Revised IRR of Chapter 17, Sanitation Code of the Philippines

[127] Chapter 8, Treatment and disposal technologies for health-care waste, website: https://www.who.int/water_sanitation_health/medicalwaste/077to112.pdf

13.3.2 Resource Development

Waste minimization of Resource Development referring to the Safe Re-Use, Recycle, and Recovery Programs.

Another option for the waste minimization is the safe re-use. Re-use is not only finding another use for a product but, more importantly, reusing the product repeatedly for a given function as intended.

13.3.2.a Material recyclability and safe re-use

a. Material recyclability and safe reuse overlap some of the elements of sustainable materials, i.e. life cycle analysis, pollution prevention, resource efficiency and materials recovery to achieve the goal of zero- waste status.

b. Safe re-use[128] is not only finding another use for a product but, more importantly, reusing the product repeatedly for a given function as intended. Before the reuse of the product, it must undergo the following steps: (1) cleaning; (2) decontamination; (3) reconditioning; (4) disinfection; and (5) sterilization.

c. Recycling materials reduces the production of greenhouse gas emissions and other pollutants by cutting down the need for extracting materials and delivering materials over long distances. It also saves energy and reduces the environmental impact of manufacturing new materials.

d. Construction waste recycling is the separation and recycling of recoverable waste materials generated during construction and renovation.

e. Proper waste recycling reduces the demand for new resources, cuts down, and effort of transportation and production.

f. Use of commonly recovered construction materials such as asphalt paving, construction site clearing debris, trees, gypsum boards, metals, concrete, wood, roofing, etc. is recommended

13.3.2.b Safe Recycled content

Another method of sustainable HCW management is recycling. Recycled content refers to the portion of materials used in a product that have been diverted from the solid waste stream. If those materials are diverted during the manufacturing process, they are being referred to as pre-consumer recycled content (sometimes referred to as post- industrial). If they are diverted after consumer use, they are post- consumers. The use of the following materials is a must:

a. Non-toxic building materials. This refers to building materials without

[128] DOH Department Circular 2020-0191, Circulation of the Health Care Waste Management Manual 4th Edition, April 23, 2020

hazardous or toxic chemicals that could cause Sick Building Syndrome (SBS) or eventually lead to Building Related Illness (BRI)

b. Paints, coatings, adhesives and sealants used indoors or in non- ventilated areas shall not contain volatile organic compounds (VOC) or should be within levels tolerable to humans.
c. Composite wood shall not have VOC, i.e. urea formaldehyde content.
d. For all other materials containing chemicals used in construction, they shall not compromise and be deleterious to the health and safety of the workers and occupants of the building.

13.3.2.c Waste Recovery[129]

The recovery of waste is defined in one of two main ways. Most simply, "recovery" commonly refers to energy recovery whereby waste is converted to fuel for generating electricity or for direct heating. In temperate climates, the heat generated by onsite incinerators may be an attractive and cost-effective option for heating hospitals, public buildings and residential districts. Alternatively, "waste recovery" is a term used to encompass recycling of waste items to be converted into new products, and composting of organic waste matter to produce compost or soil conditioner for use in agriculture or similar purposes.

Composting hospital food waste is also attracting interest, particularly in countries where the use of landfill is becoming more restrictive due to legislation, taxation, service charges or land shortages. There are legitimate concerns about compost attracting rodents and other pests; however, these problems can be minimized with careful management

13.4 Green Procurement: Waste Prevention and Reduction at Source[130]

Waste can be minimized in an HF through proper procurement planning. The HF can adopt the Green Procurement Program (GPP) wherein the process of procurement considers the environmental impact of items/goods/services. Addressing the issue of HCW at the source is more economically and environmentally beneficial than looking into the perennial issue of waste management disposal.

- Some factors to consider in green procurement are as follows:
- Less toxic
- Minimally polluting
- Energy efficient
- Safer and healthier for patients, workers, and the environment
- Higher recyclability and recycled content

Every HFs should move towards the aim of transforming a Green and Safe (Climate Smart) HF that has a sustainable future for health care. Green and Safe HF will be achieved through the strong commitment of HF and hospital staff to assume the

[129] Chartier, Yves et al., 2014, Safe Management of waste from health-care activities, WHO
[130] Health Facility Development Bureau, DOH, Health care Waste Management Manual 4th Edition 2020

governance of the health prevention measures and environmental protection. Safe and Sustainable Management of hospital and other health facilities' waste consist of measures including avoidance, reuse, recycling and disposal. Through those measures, steps are taken toward Greener and Safer Hospital and other HF, in addition to saving the cost of services that will promote achievement of sustainable waste management:

a. A Health Care Waste Storage Area with four compartments, namely: biodegradable wastes, non-biodegradable wastes, infectious wastes and recyclable waste.
b. A separate storage area for mercury-containing devices and products.
c. Color coding for plastic liners, such as black for general wastes, yellow for infectious and pathological wastes, green for biodegradable wastes, yellow with black band for chemical and pharmaceutical wastes and orange for radioactive wastes
d. A punctured proof container for sharps.
e. Wearing of proper Personal Protective Equipment (PPE) by health care waste collectors
f. Collection of waste from aseptic to septic areas
g. An approved route plan showing that collectors shall not pass through the crowded areas of HFs to prevent cross- contaminations.
h. A regular schedule of collection from the wards to the waste storage area depending on the volume of waste generated by the HFs
i. An appropriate treatment technology for each type of wastes
j. Disposal of treated wastes in a sanitary landfill
k. Allowing septic vault for pathological waste and sharp waste in areas where hazardous waste service provider is not available
l. Sewerage Treatment Plant (STP) in all hospitals. In case, they cannot provide their own STP their sewer line must be connected to Service Providers.
m. No use of mercury-containing products and devices
n. Integrated and comprehensive chemical safety management and toxicology policy in the HCW that will effectively address the gaps in chemical management. [131]
o. Encourage hospital staff, patients and carers to limit the use of plastics within the facility.

13.5 Health Care Waste Management Audit

a. A formal waste audit can be performed by an external auditor or by facility staff if staff has the expertise to do so. Waste audits can reveal the knowledge, attitude and practices of the staff as well as information on actual occupational safety practices[132]. A formal waste audit may include a waste stream audit.

[131] DOH 2019-0009, National Chemical Safety Management and Toxicology Policy, march 01, 2013

[132] Health Care Waste Management Audit Procedures, https://noharm-global.org/documents/health-care-waste-management-audit-procedures-guidance

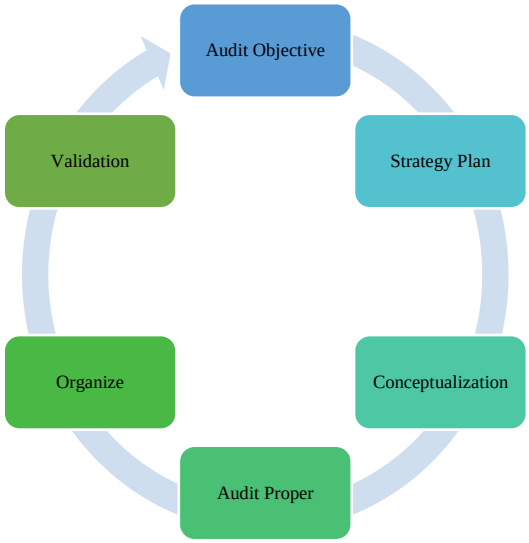
i. The facility safety officer or waste management coordinator should regularly inspect the entire facility to ensure every step of waste management is being done properly.

ii. It is the responsibility of the facility director to ensure that appropriate and adequate waste management practices are in place and that all staff are trained by them and adhere to the procedures and policies. Ultimately, it is the responsibility of the facility director to ensure that audits are conducted regularly by an individual expert or organization.

iii. It is the responsibility of the waste management oversight committee and coordinator to establish systems to monitor compliance with the agreed-upon medical waste procedures and to conduct regular and routine audits of the waste management system. After routine monitoring activities and audits, the waste management oversight committee and coordinator are responsible for identifying improvements in waste handling systems and provide recommendations to the senior management of the institution.

iv. An individual consultant or organization who is appointed by the facility director should conduct the waste audits methodically and identify the gaps in waste management practices and recommend further improvements.

Main Stages to be consider for waste audit:



Stage I - Identification of the waste audit objective

Stage II - Formulation of safety protocol and capacity building of the auditor to the HFs for data collection

Stage III - Audit conceptualization and organization

Stage IV - Waste Audit Proper

Stage V - Generation of data, and data analysis

Stage VI - Verification of Data

Note: Please refer to Health Care Waste Management Audit Procedures – Guidance Document Number: 203 of the Health Care Waste Management Audit Procedures – Guidance (https://noharm-global.org/documents/health-care-waste-management-audit-procedures-guidance.

b. The Department of Health (DOH) seeks to reshape our health facilities to reduce their environmental footprint and participate in leading the national movement for environmental health and justice through reduction of waste. One step in achieving our goals mentioned is to conduct a waste audit in our hospitals.

c. The outcome of the audit will aid in understanding the culture in the facilities regarding waste generation and translate them into reduction of waste. This activity also aims to improve healthcare waste management in accordance with the DOH Healthcare Waste Management Manual, Fourth Edition and lead the way in addressing the plastic pollution in medical facilities and efficiently use it to achieve savings.

d. The measures and strategies to mitigate the effects of the pandemic may have contributed to the increasing healthcare wastes globally and locally. Given this, the objectives of the audit also highlighted the impact of COVID-19 pandemic in terms of waste management, particularly in terms of the amount of plastic waste generated.[133]

e. HCW is generated in a medical area and should be segregated into different fractions, based on their potential hazard and disposal route, by the person who produces each waste item.[134]

f. All facility staff should know the type of waste they generate as well as how to segregate and store it in appropriate color-coded bins. Some staff, such as laboratory technicians, waste handlers and cleaning staff, have additional responsibility to manage the waste. They should be able to segregate infectious and hazardous waste from non hazardous and general waste, to know proper use of PPE, and how to handle the hazardous waste as well as how to finally dispose of the waste.[135]

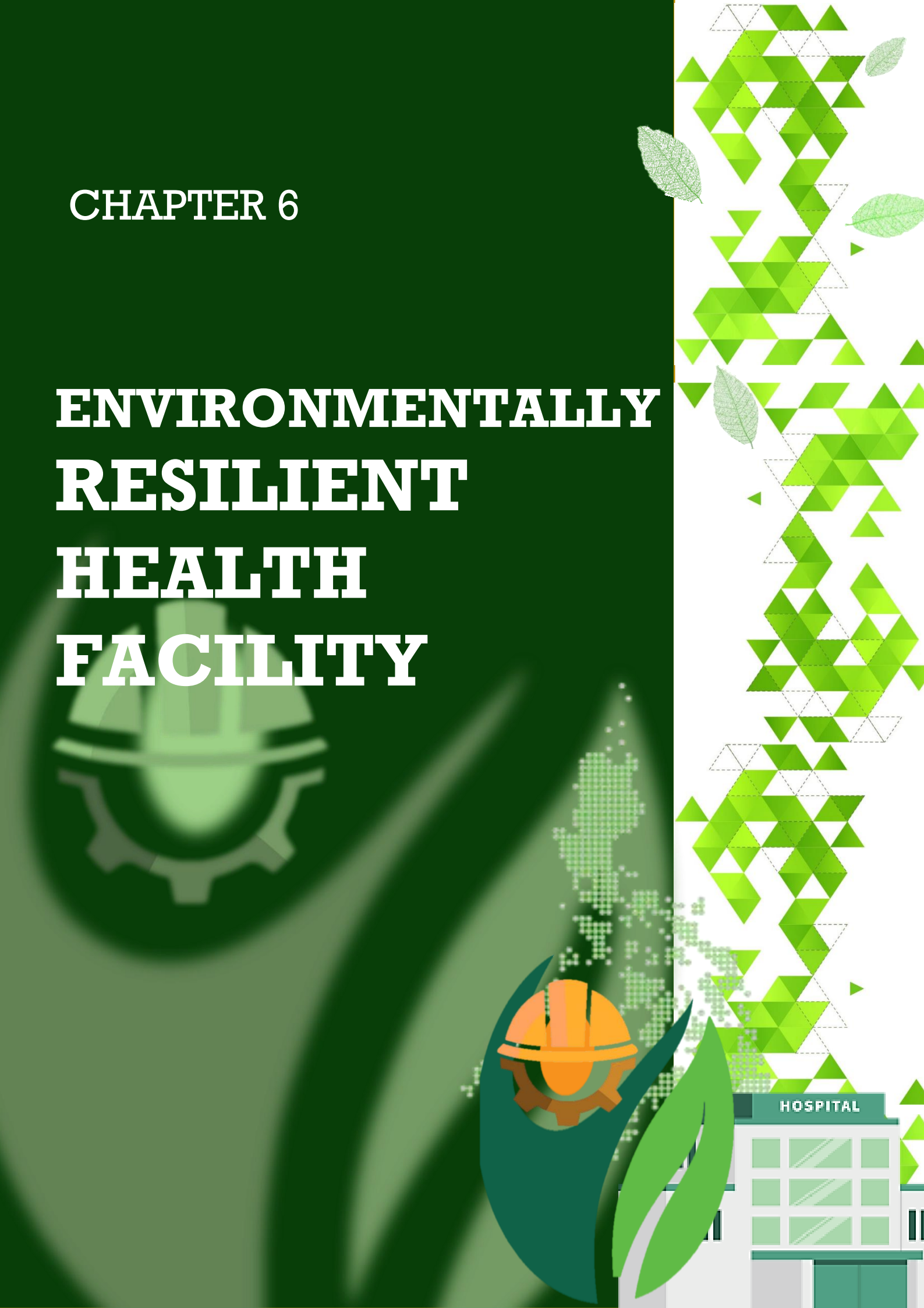
[133] Health Care Without Harm – Southeast Asia, 2021, Pilot DOH Hospitals Preliminary Audit Results and Progress Report

[134] DOH Health Care Waste Management Manual, 2020, 4th Edition

[135] Health Care Waste Management Audit Procedures, https://noharm-global.org/documents/health-care-waste-management-audit-procedures-guidance

CHAPTER 6

ENVIRONMENTALLY RESILIENT HEALTH FACILITY



Chapter 6

Environmentally Resilient Health Facility

Green & Safe Health Facilities Manual

Section 14. Safe, Resilient and Sustainable Health Facility

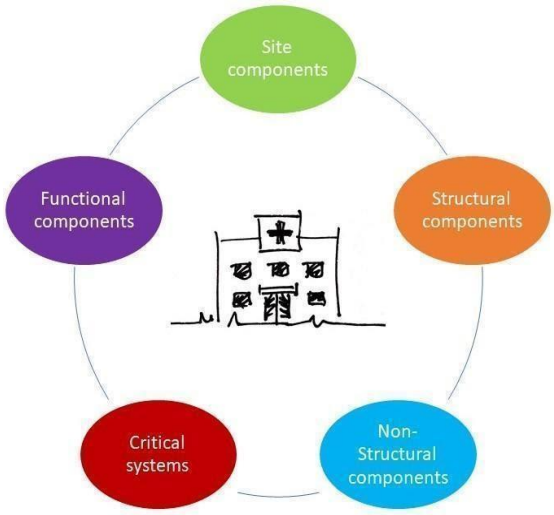
14.1 General

a. In 2015, the 3rd United Nations World Conference on Disaster Risk Reduction adopted the Sendai Framework for Disaster Risk Reduction 2015-2030. It also aligns with other international covenants (e.g. Climate Change Adaptation (CCA), the Sustainable Development Goals (SDGs), International Health Regulations (IHR) and the Paris Agreement on Climate Change.) that emphasize the need to focus on Disaster Risk Reduction (DRR) with four thematic areas- prevention and mitigation, preparedness, response and recovery and rehabilitation; and the resilience building in the health sector[136].

b. The Philippine Development Plan defines human security as the state where the rights of the Filipino family and individuals, especially the poor and vulnerable, are protected and promoted through access to education, health, housing, and social protection, while ensuring environmental sustainability. The objective of the National Strategic Priority on the Human Security Agenda is to reduce risks of men and women and other vulnerable groups (children, elderly and person with disability, etc.) from climate and disaster[137].

c. Based on the Philippine Health Facility Development Plan 2040[138], Philippines aspires to reduce the supply gaps in health facilities, a concomitant goal is to have safe, sustainable and resilient health infrastructure. That all new health facilities will need to consider the following principles of safe, sustainable, and resilient infrastructure, but existing health facilities also need to be improved in order to meet the criteria for Environmentally Resilient Health Facility:

- Site components. Physical environment, such as topographical, geographical, climate, historical, legal, and other infrastructural elements.
- Structural components. Load-bearing components that make a building stand including foundations, footings, columns and beams to resist gravity, earthquakes, wind, floor, and other pressures.
- Non-structural components. Non-load bearing features and contents of the building, such as walls, divisions, partitions, windows, doors, ceilings, and floor finishing.
- Critical systems and lifeline facilities. Components of the building that enable and support

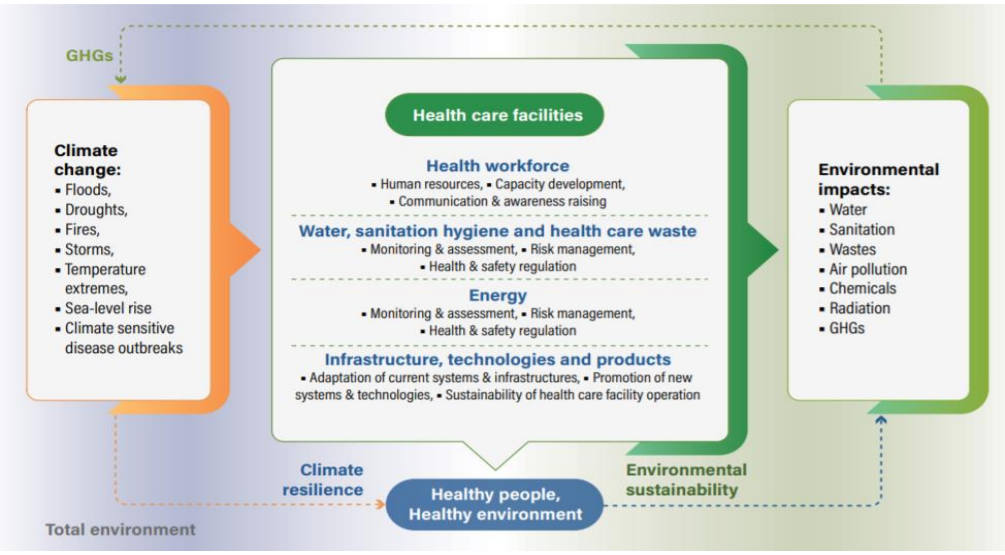


[136] DOH Administrative Order 2019-0046, National Policy on Disaster Risk Reduction and Management in Health DRRM-H
[137] National Climate Change Action Plan: 2011-2028, CCC
[138] DOH Department Circular No. 2020-04112, Circulation of the Philippine Health Facility Development Plan 2020-2040

the adequate functioning of a facility (energy, heating, cooling, ventilation, water supply, ICT, waste and essential medical and laboratory equipment).

- Functional components. Systems, procedures, and protocols to enable a hospital to have capacity to remain functional and operational. These include emergency preparedness, response and recovery plans, and the building of capacity of hospital workforce.

d. Climate resilient and environmentally sustainable health facilities can be defined as those capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, so as to bring ongoing and sustained health care to their target population and protect the health and well-being of future generations.[139]



e. Green and Safe Health Care Facility (HF) otherwise known as Climate Smart HF shall aspire the country to reduce the supply gaps in health facilities and to have a safe, sustainable and resilient health infrastructure. The elements of a safe, sustainable and resilient health facilities are the following: Site components, Structural components, Non-structural components, Critical systems and lifeline facilities and Functional components. Each of the components shall be used as benchmarks to increase safety, sustainability and/or resilience of the hospital and other health facilities.

14.2 Applicability

14.2.1 This measure applies to all Health Facilities (HFs) design of:

a) Government-owned and Private
b) New buildings and their designs and systems; and
c) Any expansion and/or modification of building designs or systems.

14.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

[139] WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities, Geneva: World Health Organization; 2020.

14.3 Requirements

a. A need to institutionalize Disaster Risk Reduction and Management in Health (DRRM-H) to enhance the capacities of the health system to manage health risks and attain resilience[140]. Minimum indicators of an institutionalized DRRM-H[141] are:
   1. DRRM-H Plan - updated, approved, disseminated and regularly tested;
   2. Health Emergency Response Teams (HERTs) - organized and trained;
   3. essential health emergency commodities - available and accessible; and
   4. functional operations center

   This will be done through the 5K approach or the *Kaligtasang pang Kalusugan sa Kalamidad sa Kamay ng Komunidad* (Health Disaster Safety in the Hands of the Community). This will guide planners at all levels of governance to formulate disaster risk reduction measures for each of the four thematic areas: Prevention and Mitigation, Preparedness, Response, and Recovery and Rehabilitation.

DRRM-H Planning follows the six key steps in a systemic and systematic manner to ensure comprehensiveness, soundness, and feasibility.

Table 10[142]
Phases in Establishing and Managing Appropriate Standards at All Levels

a. Evaluate the capability of community infrastructure to be able to withstand projected storms and flooding and the period that emergency backup systems will need to be used when the community infrastructure is disrupted.

b. Hospitals and other health facilities shall utilize and build upon their existing organizational structures and systems to mainstream and adopt the Hospitals Safe from Disasters program.

[140] DOH Administrative Order 2019-0046, National Policy on Disaster Risk Reduction and Management in Health DRRM-H
[141] DOH-HEMB, 2020 , Disaster Risk Reduction and Management in Health (DRRM-H) Planning Guide, Part 1
[142] DOH-HEMB, 2020 , Disaster Risk Reduction and Management in Health (DRRM-H) Planning Guide, page 7

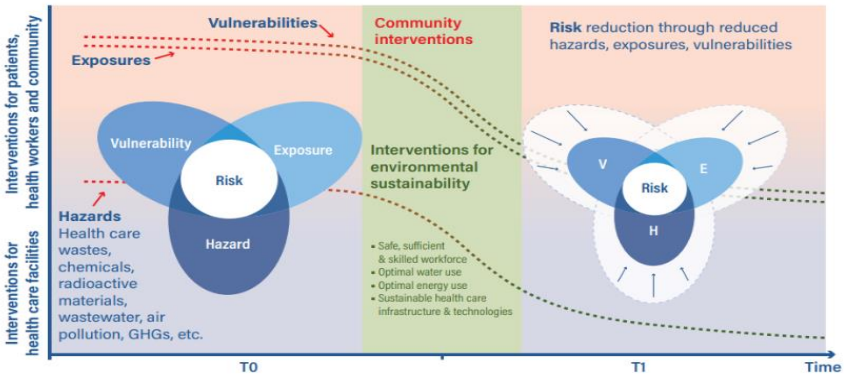
c. Hospitals and other healthcare facilities[143] shall be prepared to address the operational challenges attendant to emergencies and disasters hence all efforts should be exerted for these facilities to remain standing and functional. Also, health facilities to undergo yearly self-assessments and action plans to address their structural, non-structural, and functional vulnerabilities and capacities using the most current assessment tool.

d. Evaluate the impact of storms and flooding will have on roads, ferries and other transportation systems needed by staff to get to work, and transport patients to higher acuity health facilities.

14.4 Climate Resilient and Environmentally Sustainable Health Facilities

a. All hospitals and other health facilities shall regularly conduct and sustain capacity building for the effective implementation of Hospitals Safe from Disasters.

b. Increasing Climate resilience in Health Facilities to be capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring ongoing and sustained health care to their target populations, despite an unstable climate. The illustration[144] shows the important dynamics affecting the climate resilience of health facilities. Building on the concept of risk as a function of hazards, vulnerabilities and exposures. It also highlights the risk management steps for prevention, preparedness, response and recovery.



c. To build resilience[145] in health facilities include bolstering the health workforce (such as training, communications), optimizing access to food, water, sanitation and health care waste services through monitoring, assessment and management, improving access and reliability of energy sources (such as back-up systems, alternative sources of energy, emergency plans), as well as the adaptation of infrastructures and technologies (such as building retrofits, adoption of new systems and technologies, sustainability of

[143] DOH Administrative Order No. 2013-0014, Policies and Guidelines on Hospitals Safe from Disasters

[144] WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities, Geneva: World Health Organization; 2020, Chapter 3, Applying a climate resilient and environmentally sustainable lens to health facilities

[145] WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities, Geneva: World Health Organization; 2020, 3.2 – Increasing Climate Resilience in Health facilities

operations).

d. Increasing Environmental Sustainability in Health Facilities[146] to improve, maintain or restore health, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it.

e. Environmental sustainability aims to reduce hazards resulting from health facility operations (such as health care waste), while simultaneously working towards decreasing exposures and vulnerabilities, both within and outside the health facility. Health Facilities need to also optimize their use of natural resources, principally that of water and energy, ensuring a balance that is not too low to maintain good functioning, or too high to waste and deplete resources. Thus, in many health facilities in low resource settings, the aim is to increase their access and use of water and energy. Interventions for environmental sustainability are key to move from higher risk to lower risk situations.

f. Understand the intervention to build Climate Resilience and Environmental Sustainability in Health Facilities. WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities[147] promotes the intervention on health workforce; water, sanitation and health care waste; energy; and infrastructure, technology and products. The proposed list of interventions does not cover every action that may be needed. However, this list provides a comprehensive set of interventions that would significantly increase climate resilience and environmental sustainability in the short and long short and long term.

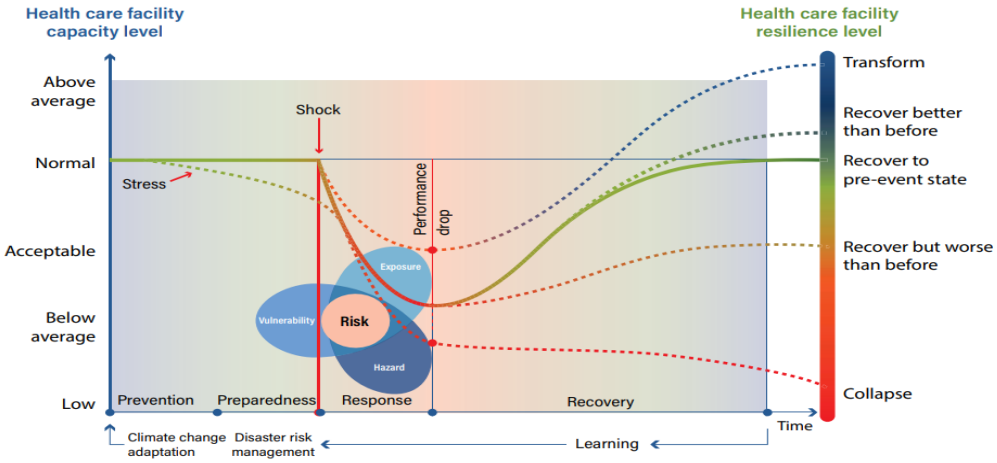
e. All hospitals and other healthcare facilities shall develop and regularly update, disseminate, implement, and test their Hospital Emergency Preparedness, Response, and Recovery Plans (HEPRRP) to include the following[148]:

i. their changing hazards and vulnerabilities
ii. the historical and projected data of emergencies and disaster
iii. the changing global landscape such as climate change, terrorism, emerging and re-emerging diseases, and others
iv. the existing structures, systems, and mechanisms for emergency preparedness and response.

[146] WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities, Geneva: World Health Organization; 2020, 3.3 – Increasing Environmental sustainability

[147] https://www.who.int/publications/i/item/climate-resilient-and-environmentally-sustainable-health-care-facilities

[148] DOH Administrative Order No. 2013-0014, Policies and Guidelines on Hospitals Safe from Disasters



14.5 Risk Management for Health Facilities[149]

Hospitals, primary care facilities, laboratories, pharmacies and blood banks work with non-health sectors, including energy and water supplies, transport, and emergency services to ensure the continuity of health services. Governments and communities can make health facilities safer and better prepared for emergencies by:

- Developing and implementing national policies and programs to make health facilities safe in emergencies.
- Selecting a safe site for health facilities.
- Designing and constructing safe health facilities.
- Assessing the safety of existing health facilities, e.g. by applying the Hospital Safety Index.
- Protecting health workers, equipment, medicines and supplies.
- Ensuring that health facilities receive essential services.
- Developing partnerships between health facilities and the community.
- Developing emergency risk management programs and response plans for facilities.
- Testing and updating response plans with exercises.
- Training health workers to respond to emergencies.
- Evaluating and learning lessons from past emergencies and disasters.

Section 15. Hospital Safety

15.1 General

a. The DOH has adopted the country's strategic direction such as the AmBisyon 2040 vision of Filipinos being among the healthiest people in Southeast Asia by 2022, and in Asia by 2040; and National Disaster Risk Reduction and Management Plan

[149] Safe Hospital: Prepared for Emergencies and Disasters, May 2011, Disaster Risk Management for Health, https://www.who.int/hac/events/drm_fact_sheet_safe_hospitals.pdf?ua=1#:~:text=Hospitals%20and%20other%20health%20facilities,basis%20and%20when%20disaster%20strikes.&text=Safe%20hospitals%20protect%20patients%2C%20visi,in%20health%20infrastructure%20from%20hazards.&text=Safe%20hospitals%20continue%20to%20function,saving%20medical%20care%20in%20disasters.

(2011-2028) of a safer, adaptive and disaster resilient Filipino communities toward sustainable development. Republic Act 11223 or the Universal Health Care (UHC) geared toward reducing vulnerability to climate change and disaster impacts seeks to address health access and equity[150].

b. Hospitals and other health Facilities are vital to saving lives, providing care during emergencies, and aiding community recovery. Records show that health facilities and health workers are among the major casualties of emergencies, disasters and other crises. In recent years, increasing attention has been given to the security of health workers and facilities, and to the sustainability and energy efficiency of "smart" or "green" hospitals.[151]

c. The patient has the right to healthy and safe environment that is conducive to good health supportive of the rest and recuperation. Hence, aside from ensuring the safety and protection of patients, carers, clients and health workers, another concern of the HFs is the safety of its buildings. Reasonable safety measures should be assured within the hospital facility. Hospitals should be able to remain operational after an 8.0 earthquake[152].

d. It is expected for a hospital building to remain standing and functional particularly during and after natural disasters to protect the health of their communities in accordance with Policies and Guidelines on Hospitals Safe from Disasters (DOH-AO No. 2013-0014). This shall ensure that existing hospitals and health facilities, as well as those that will be built in the future, shall continue to function and save lives during emergencies and disasters.

e. A safe hospital is a facility whose services remain accessible and functioning at maximum capacity, and with the same infrastructure, before, during and immediately after the impact of emergencies and disasters. The continuing functionality of the hospital depends on a range of factors, including the safety of its buildings, critical systems and equipment, the availability of supplies, and the emergency and disaster management capacities of the hospital, particularly for response to and recovery from hazards or events which may occur.[153]

f. Hospitals and other health facilities should be a source of strength during emergencies and disasters.[154]

g. All hospitals shall ensure surge capacity to be able to manage increased demand.

[150] DOH Administrative Order 2019-0046, National Policy on Disaster Risk Reduction and Management in Health DRRM-H)

[151] Who, 2015, Hospital Safety Index Guide for evaluators 2nd edition, https://hospitalsafetypromotionanddisasterpreparedness.files.wordpress.com/2018/03/hospital_safety_index_evaluators_who_2015.pdf

[152] Bobrow / Thomas and Associates, 1995

[153] WHO, 2015, Hospital Safety Index Guide for evaluators 2nd edition, https://hospitalsafetypromotionanddisasterpreparedness.files.wordpress.com/2018/03/hospital_safety_index_evaluators_who_2015.pdf

[154] Safe Hospitals in Emergencies and Disasters: Philippine Indicators 2nd edition, Protect hospitals and health facilities in emergencies and disasters

15.2 Applicability

15.2.1 This measure applies to all Hospital design of:

a. Government-owned and Private
b. New buildings and their designs and systems; and
c. Any expansion and/or modification of building designs or systems.

15.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

15.3 Requirements

a. It is imperative that Hospitals and other health facilities remain structurally sound and fully operational at such times.[155] To ensure safety and continuous operations, examine the building, structural code, fire safety and electrical code and other guidelines or regulations related to the structure and function of hospitals and health facilities.

b. As part of the Policies and Guidelines on Hospitals Safe from Disasters[156] , it aims to reduce disaster risks to ensure the protection and the continuous operations of hospitals and other health facilities, and save lives during emergencies and disasters.

c. In reference to the Safe Hospital in Emergencies and Disasters: Structural, Non-Structural and Functional Indicators[157], during emergencies or disasters, hospitals and other health facilities must remain safe, accessible and functioning at maximum capacity in order to help save lives. To ensure that hospitals and health facilities can withstand emergencies and disasters, an assessment of their vulnerabilities is most significant. These vulnerabilities may be structural (load-bearing system), non-structural (architectural elements, installation and equipment) and systems and operations. To guide the Hospital and other health facilities, to adhere the following:

    i. assess existing hospitals and health facilities in terms of structural, non-structural and functional vulnerabilities;
    ii. advocate for construction of a new hospital or health facility that could withstand any emergency or disaster; and
    iii. plan for renovation and retrofitting of hospitals and health facilities to ensure their resilience, safety and continuous operations in times of emergency and disaster.

d. Continuing effort in the enrichment of the safe hospital tool at the global level that the Department of Health has considered the coherence of the Safe Hospital

[155] Safe Hospital in Emergencies and Disasters: Structural, Non-Structural and Functional Indicators, 2010, World Health Organization, https://www.who.int/publications/i/item/9789290614784

[156] DOH Administrative Order No. 2013-0014, Policies and Guidelines on Hospitals Safe from Disasters

[157] Safe Hospital in Emergencies and Disasters: Structural, Non-Structural and Functional Indicators, 2010, World Health Organization, https://www.who.int/publications/i/item/9789290614784

Assessment Tool[158], hospitals represent more than 70% of public spending on health in countries. For that reason, the HSI is a very important tool for moving closer to the goal of hospitals that are less vulnerable but safer and better prepared for emergencies and disasters.

e. The HSI not only estimates the operational capacity of a hospital during and after an emergency, but it provides ranges that help authorities determine which hospitals most urgently need actions to improve their safety and functionality.

f. HSI yields useful information about a hospital's strengths and weaknesses and points to the actions required to improve the safety and disaster risk management capacities of a hospital.[159] Priority might be given to a hospital which has a poor level of safety which would put the lives of occupants at risk during an emergency or disaster.

15.4 Hospital Safety Index

The following indicator in the HSI Philippine Evaluation Forms will be adopting to this Green Manual that will be the primary diagnosis of hospital's safety capacity to provide services in the event of emergencies and disasters:

a. *Hazards affecting the safety of the hospital and the role of the hospital in emergency and disaster management*. This parameter will allow for a rapid description of external and internal hazards or dangers and geotechnical properties of soils at the site of the hospital that may affect the safety or functioning of the hospital.

b. *Structural Safety*. This involves the assessment of the type of structure and materials, and previous exposure to natural and other hazards. This parameter will determine if the hospital infrastructure meets standards for providing services to the population even in cases of major emergency or disaster, or whether it could be affected in a way that would compromise structural integrity and functional capacity. The following will be considered for this parameter, but not limited to:

    i. The management of the hospital should investigate the conditions of the structural member of the buildings, specifically during prior events and hazards affecting building safety and integrity. They should assess prior major structural damage or failure of the hospital building(s), whether the hospital was built and/or repaired using current safety standards, and the effect of behavior or modification on the structural behavior of the hospital.

    ii. For its building integrity the hospital must evaluate the structural system design, condition of the building, condition of the construction materials, interaction of nonstructural elements with the structure, proximity of buildings for earthquake-induced pounding (Separation is more than 1.5%

[158] Health Emergency Management Bureau, Department of Health, 2016, Hospital Safety Index Philippine Evaluation Forms for Hospital Levels 1 to 3, https://hospitalsafetypromotionanddisasterpreparedness.files.wordpress.com/2018/03/hospital-safety-index-forms_doh_dec_2016.pdf

[159] WHO Guidance for Climate Resilient and Environmentally Sustainable Health facilities, Geneva: World Health Organization; 2020.

of the height of the shorter of two adjacent buildings); proximity of buildings (wind tunnel effect and fire), the separation should be more than 15m; structural redundancy, structural detailing, including connections, ratio of column strength to beam strength, the strength of columns should be greater than strength of beams; safety of foundations, irregularities in building structure plan (rigidity, mass, resistance), irregularities in elevation of buildings, irregularities in height of story's, structural integrity of roofs, and structural resilience to hazards other than earthquakes and strong winds.

iii. Structural safety focuses on the structural components of the health facility, such as foundations, bearing walls, columns and beams, staircases, floors and roof decks, or other types of structural components that help support a building. Structural safety may also refer to site features, such as roads and bridges. Often structural components of buildings are governed by building codes, but building codes typically provide prescriptive regulations focused on minimum safety requirements and may not consider the increasing frequency and intensity of storms and weather patterns driven by climate change. Therefore, facility disaster planning should include climate change induced weather damage potential as well. Health Facilities structural components should be built, or enhanced, to be able to withstand these projected structural vulnerabilities.

iv. Confirm that structural components of the health facility, such as foundations, bearing walls, columns and beams, staircases, floors and roof decks, or other types of structural components can withstand the wind loads associated with the predicted storms, rather than simply meeting the building code requirements, and strengthen key structural components as needed. Fortify facility structure, as needed, and site drainage capacity to be able to withstand predicted storm and flood conditions.

c. *Non-structural Safety.* Nearly 80% of the total cost of the facility is made up of non-structural components. The non-structural elements[160] are all other elements that, without forming part of the resistance systems, enable the facility to operate. They include architectural safety, infrastructure protection, access and physical security, critical system, and equipment and supplies. Some of the parameter to be considered are the following, but not limited:

i. Non-structural safety includes other essential components of the facility such as walls, windows and doors, as well as mechanical and electrical equipment. They also include breakdowns or disruption of essential infrastructure, such as, electrical and mechanical equipment, water, sewage, communications, transportation and supplies of food, materials and medicine.

ii. Analysis of non-structural vulnerabilities and the potential hazards from climate should influence the design of health facilities. It confirms that

[160] Safe Hospitals in Emergencies and Disasters: Philippine Indicators 2nd edition, Protect hospitals and health facilities in emergencies and disasters

the non-structural components of health facilities will enable health facilities to remain operational during and after natural disasters to protect the health of their communities.

iii. To address non-structural safety vulnerabilities

- Build or modify health facilities so the ground floor and essential services/equipment are above anticipated flood levels

- Increase energy and water efficiency and renewable energy generation at the health facility to reduce the emergency systems demands.

- Locate (or relocate if needed) essential facility services and equipment above projected flood levels, so they can remain operational during and after major storm or flooding events. Essential facility services and equipment include, but are not limited to, water pumps, electrical equipment (and emergency power generators) connections and controls, waste storage and treatment facilities, telecommunications and internet equipment.

- In facilities with rooftop ventilation equipment, confirm that equipment and ductwork attachments to the building are strong enough to withstand the wind loads from predicted storm conditions, and are protected from damage from airborne debris.

iv. The non-structural member must be inspected on a regular basis for safety. The inspection must be focused on the following critical systems:

1. Electrical Systems
   - capacity of alternate sources of electricity
   - regular tests of alternate sources of electricity in critical areas
   - condition and safety of alternate sources of electricity, electrical equipment (such as cables and cable ducts)
   - control panels, overload breaker switches, cables
   - internal and external lighting system
   - redundant system for the local electric power supply
   - lighting system for critical areas of the hospital external electrical systems installed for hospital usage
   - emergency maintenance and restoration of electric power supply and alternate sources

2. Telecommunications systems
   - condition and safety of antennas,
   - low- and extra-low voltage systems (internet and telephone),
   - telecommunications equipment and cables,
   - sites for telecommunication systems and internal communications systems; alternate communication systems;
   - effect of external telecommunications systems on hospital

communications; and emergency maintenance and restoration of standard and alternate communications systems;

3. Medical gases systems
   - location of storage areas for medical gases
   - safety of storage areas for medical gas tanks and/or cylinders
   - condition and safety of medical gas distribution system
   - medical gas cylinders and related equipment in the hospital
   - availability of alternative sources of medical gases
   - emergency maintenance and restoration of medical gas systems

d. *Emergency and Disaster Management* – This will consider the level of preparedness of a hospital's organization, personnel and essential operations to provide patient services in response to an emergency or disaster. And, hospital's response to emergencies and disasters, available plans and capacities for evacuation and response (including patient-care services, mass casualty management, triage and decontamination), human, finance and logistical resources for disaster preparedness and response, communication and information management, availability of staff, and safety and security of the staff.

15.5 Hospital Planning

In addition to the DRMM-H institutionalization, the Planning: Hospital[161] can be adopt to guide the planning process conducted at the hospital level is to gather baseline data and identify gaps/vulnerabilities and weaknesses by accomplishing the Hospital Safety Index (HSI)[162] Tool. The HSI Tool complements the Green Viability Assessment Tool from the Hospital Safety Index Tool vulnerability assessment will be used as basis for identifying strategies and activities that will be included in the Prevention and Mitigation Plan.

a. Conduct a risk assessment using Strategic Tool for Assessing Risk (STAR)[163] that will give priority. The result will be used for the Risk Assessment as basis for identifying strategies and activities for Preparedness Plan.

b. With this, Hospital Response Plan[164] that includes a compendium of Standard Operating Procedures (SOPs), will involve the actual implementation of procedures for the developed systems, and provision of life-saving and essential services during or immediately after a disaster.

c. To restore and improve facilities and organizational capacities on hospital operations to reduce disaster risks in accordance with the "building back better" principle, a Disaster Rehabilitation and Recovery Plan shall be achieved by the

[161] DOH-HEMB, 2020 , Disaster Risk Reduction and Management in Health (DRRM-H) Planning Guide, Part 2B

[162] Hospital Safety Index Philippine Evaluation Forms, Department of Health, December 2015

[163] DOH-HEMB, 2020 , Disaster Risk Reduction and Management in Health (DRRM-H) Planning Guide, Annex 12: Strategic Tool for Analyzing Risk

[164] DOH-HEMB, 2020 , Disaster Risk Reduction and Management in Health (DRRM-H) Planning Guide, Developing/Updating the Plan

hospital.

d. For Private Hospitals, ensure that the plan is disseminated to all staff and is readily available in case the hospital is invited for collaboration/ partnership during emergencies and response operations in their respective areas.

CHAPTER 7

MATERIAL SUSTAINABILITY

Chapter 7

Material Sustainability

Green & Safe Health Facilities Manual

Section 16. Sustainable Green Materials

16.1 General

a. Building construction consumes 40% of the raw stone, gravel, and sand used worldwide annually, and 25% of the raw timber. From the environmental impact perspective, the building sector has a significant effect on the entire environment[165] [166]. The design of green buildings should thus begin with the selection and use of eco-friendly materials with related or better features than traditional building materials. Building materials are usually selected through functional, technical and financial requirements[167].

b. Guidelines for adopting resource efficiency measures in building design, construction and operations while minimizing the negative impact of HFs on human health and the environment is of prime importance to the Department of Health.

c. In the context of green HFs, sustainable materials are those products that have low embodied energy. They provide environmental, social and economic benefits while protecting public health and environment over their whole life cycle, from the extraction of raw materials, manufacturing, delivery, installation until the final disposal.

d. Sustainability can be achieved through green materials. Green materials had a unique property including being abundant in nature, less toxic, economically affordable and versatility in terms of physical and chemical properties. Embracing green building materials is a good alternative to HFs material sustainability.

e. Resource efficiency promotes a more efficient use of resources such as money, materials, labor and other assets while minimizing waste and improving occupational health and safety management. It departs from the earlier concept of handling resources where they were simply extracted, used and thrown away. Today, it means putting back in the loop resources, so they can stay in use for longer.

f. The Philippine Green Building Code (GB Code) is meant as a guideline for adopting resource efficiency measures in building design, construction and operations while minimizing the negative impact of buildings on human health and the environment.

g. The hospital and other health facilities must also follow the green procurement policy in preparing the specifications of their supplies, materials and equipment.

[165] Yu C. Environmentally sustainable acoustics in urban residential areas. PhD dissertation. University of Sheffield, UK: School of Architecture; 2008.

[166] Umar, U A et al, 2014, Sustainable building materials for Green Building construction, conversation and refurbishing

[167] Umar, U A et al, 2014, Sustainable building materials for Green Building construction, conversation and refurbishing

16.2 Applicability

16.2.1 This measure applies to all Health Facilities (HFs) design of:

a. Government-owned and Private
b. New buildings and their systems
c. Any expansion and/or modification of buildings or systems

16.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

16.3 Requirements

16.3.1 Sustainable Building Materials Life Cycles

Principles of Life Cycle Design follows principles and guidelines for selecting green building materials. It should organize into three stages:

a. Pre-Building Phase

This is the production and delivery process of materials not including the point of installation. Also, consist of getting the raw materials in the environment as well as extracting, manufacturing, packaging and transportation to the construction site.

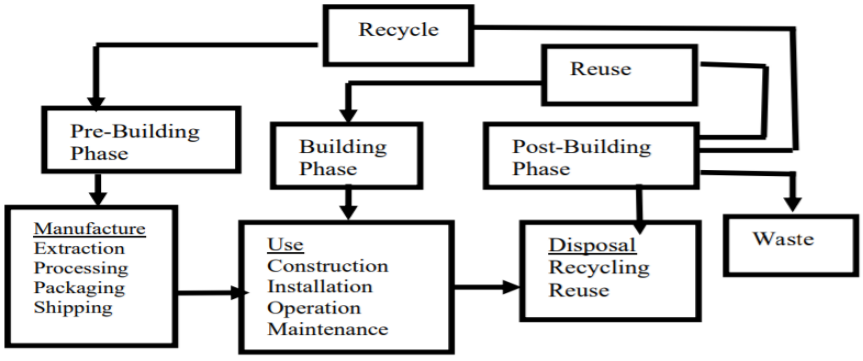
b. Building Phase

From the point of selecting the building materials and assembling it to the structure. This involved the maintenance and repair, and goes all over the lifetime process of material as part of the HFs.

c. Post-Building Phase

This is when the performance of the green building materials has run out. This stage is how the material could possibly be recycled, reused or thrown away. The energy embodied in the construction of a HFs and manufacturing these materials will be wasted if they are not effectively and efficiently utilized.

Figure 6. Three Phases of the Sustainable Building Material Life[168]



[168] Umar, U A et al, 2014, Sustainable building materials for Green Building construction, conversation and refurbishing

16.3.2 Locally-sourced materials

a. Regional materials or locally-sourced materials are those that are produced within a certain distance from the project site.

b. Identify sources of locally manufactured materials for the project, must be:[169]
   - Manufactured within 160 kilometers from the project,
   - Materials permanently installed in the project, and
   - Procure at least ten percent (10%) locally manufactured materials for the project

c. It is important to establish the distance between the project site and the manufacturer's location as each step of the journey burns transportation fuel. If the travel distance is reduced, a product's environmental impact is greatly lessened. This in turn creates a much smaller carbon footprint for the materials.

16.3.3 Embodied energy

a. Embodied energy is the energy used for all the processes related to the production of a building, from the extraction, processing of natural resources to manufacturing, transport and product delivery.

b. Embodied energy does not include the operation and disposal of the building material, which would be considered in a life cycle approach. Embodied energy is the "upstream" or "front-end" component of the life cycle impact of a home. The single most important factor in reducing the impact of embodied energy is to design long life, durable and adaptable buildings.

c. Every building is a complex combination of many processed materials, each of which contributes to the building's total embodied energy. Renovation and maintenance also add to the embodied energy over a building's life.

d. Choices of materials and construction methods can significantly change the amount of energy embodied in the structure of a building, as embodied energy content varies enormously between products and materials. Assessing the embodied energy of a material, component or whole building is often a complex task.

e. In accordance to Resolution No. 1363, Series of 2020 by the National Solid Waste Management Commission (NSWMC) of the Department of Environment and Natural Resources (DENR) entitled *"Resolution Directing the Department of Environment and Natural Resources (DENR) to Prepare and Implement the Banning of the Use of Unnecessary Single-Use Plastics by National Government Agencies (NGAs), Local Government Units (LGUs) Offices and All Other Government Controlled Offices."* Also, encourage hospital staff, patients and carers to limit the use of plastics within the facility, promote and consider the implementation of prohibition on the use of unnecessary single-use plastics.

[169] BERDE Professional basic training course, BERDE v 3.1.0, Philippine Green Building Council

16.3.4 Rapidly renewable materials

a. A rapidly renewable material is defined as a material that has the capacity to regenerate itself in 10 years or less. That includes bio-based products made from plants harvested on a 10-year (or shorter) cycle.

b. The goal of using rapidly renewable content is to reduce the number and quantity of products made from fossil-fuel derivatives.

c. About 2.5% of the material cost must be rapidly renewable to be considered green[170]

16.3.4.a Sustainable construction materials that can be used:[171]

a. Floor slabs
   - Hollow core precast slab
   - In-Situ reinforced concrete slab
   - Light gauge steel floor cassette
   - Precast concrete double tee units
   - Precast RC planks and joist system
   - Re-use of existing floor slab
   - Timber floor construction

b. Roof construction
   - Aluminum sheets on steel rafters
   - Aluminum sheets on timber rafters
   - Asphalt shingles on steel rafters
   - Asphalt shingles on timber rafters
   - Brick panel roofing system
   - Clay roofing tiles on steel rafters
   - Hollow core precast slab
   - In-situ concrete slab
   - Re-use of existing roof

c. External walls
   - Wire panel with Shot-Crete both side
   - Aluminum-clad sandwich panel
   - Lightweight concrete blocks
   - Cement fiber boards on metal studs
   - Common brick wall with internal & external plaster
   - In-situ reinforced concrete wall
   - Plasterboards on timber studs
   - Precast concrete panels
   - Rammed earth block walls
   - Re-use of existing wall

[170] Handbook of Green Building Design and Construction: LEED, BREEAM, and Green Globes, 2019
[171] EDGE Certification System

d. Internal walls
- Wire panel with shotcrete both side
- Cellular lightweight concrete blocks
- Cement fiber boards on metal studs
- Common brick wall with internal & external plaster
- Precast concrete panels
- Rammed earth block walls
- Re-use of existing wall

e. Flooring
- Ceramic tile
- Cork tiles
- Finished concrete floor
- Laminated wooden floor
- Linoleum sheet
- Nylon carpets
- Parquet/ wood block finishes
- Re-use of existing flooring
- Stone tile/ slabs
- Terracotta tiles
- Vinyl flooring

f. Window frames
- Aluminum
- Aluminum clad timber – aluminum
- Re-use of existing window frames
- Steel
- Timber
- UPVC

g. Fire protection system
- condition and safety of the fire protection (passive) system
- fire/smoke detection systems
- fire suppression systems
- water supply for fire suppression
- emergency maintenance and restoration of the fire protection system

16.3.5 Building reuse or adaptive reuse

a. Adaptive reuse is the process of retrofitting old buildings for new uses. It allows structures to retain their historic integrity while meeting the needs of new occupants. Communities have much to gain from adapting and reusing buildings. Adaptive reuse avoids the wasteful process of demolition and reconstruction.

b. Environmental benefits, combined with energy savings and the social advantage of repurposing a place with valued heritage, make adaptive reuse an essential component of sustainable development.

c. Adaptive reuse is different from restoration or preservation. While a restoration or preservation project involves restoring a building to its original state, adaptive reuse changes the intent of a structure to meet the modern user's needs. There can be many cost advantages to reusing an older structure, such as lower establishment costs. Also, there are additional savings that result because the structure is already in place.

16.3.6 Green Public Procurement

The Department of Health encourages the health facilities for establishment of Green Public Procurement (GPP) System in the Health Care Facility through DOH Department Memorandum No. 2019-0280. The GPP System as stated in Government Procurement Policy Board (GPPB) Resolution No. 15-2013, "Approval to Support the Implementation of Sustainable and/or Green Public Procurement Regime in Government," dated May 10, 2013. In subsequent Resolution No. 25-2017, the GPPB recognized the Philippine GPP Roadmap, which describes a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycles.

These GPPB resolutions follow through Executive Order (E.O.) No. 301, series of 2004, "Establishing a Green Procurement Program for All Departments, Bureaus, Offices and Agencies of the Executive Branch of Government," and mainstreams E.O. No. 301 with the promulgation of Republic Act No. 9184, the "Government Procurement Reform Act" and implementing rules and regulations. In encouraging the GPP System, the DOH also promotes the adoption of green technical specifications, sustainable consumption and production, green economy and sustainable development, and green, safe, climate smart health care facilities.

As stated in the Philippine Green Public Procurement Roadmap[172], procuring entities are an important target group for training and awareness raising efforts on GPP; they will play an important role for the nation-wide application of GPP through adhering to GPP procedures, particularly in the field of non-CSEs but also in providing feedback and records on their overall experiences with GPP. For example, educational and health-care facilities also play a prominent role to promote green purchasing to the wider public. Also, GPP contributes to the development objectives of the Philippines; it supports the enforcement of sector policies relevant for sustainable development such as energy, water and material efficiency, waste reduction, pollution and emission prevention including climate change mitigation, local and rural development, greening supply chains, greening infrastructure and works, industry productivity, innovation and competitiveness, inclusive business models and green jobs.

16.3.7 Sustainable, healthy food procurement and service

a. Globally, obesity has more than doubled since 1980, with 65% of the world's population living in countries where overweight and obesity kill more people than underweight. According to WHO, many low- and middle-income countries are now facing a double burden of disease. While they continue to deal with the problems

[172] The Philippine Green Public Procurement Roadmap, 2017 Government Procurement Policy Board - Technical Support Office, Philippines

of infectious disease and under-nutrition, they are experiencing a rapid upsurge in non-communicable disease risk factors such as obesity and overweight, particularly in urban settings.

b. This increases the global demand for resource-intensive therapies, and therefore increases both health care costs and the health sector's environmental footprint as it spends more energy and resources to treat these diseases.

c. The globalization of food production and trade has fostered the increasing consolidation of our food system into an efficient model that generates numerous impacts on human and environmental health such as pesticide exposure, water contamination, food safety risks, antibiotic resistant bacteria exposure, and a scale of food production systems that are greater than surrounding available resources.

d. Health Facilities in many countries are major consumers of food and can model and promote healthy and sustainable systems through their food choices. A growing number of health facilities in developed and developing countries that purchase and serve food to patients and workers are reducing their environmental footprint and improving patient and worker health by making changes in hospital service menus and practices. These include limiting the amount of meat in hospital meals, cutting out fast and junk food, composting or bio-digesting food waste, buying locally and sustainably farmed foods, producing their own food onsite, and holding farmers' markets for local producers to sell healthy food to the community.

e. By promoting and supporting nutritious, localized sustainable food systems, hospitals can both reduce their own immediate footprint while supporting food access and nutrition, thereby helping to foster the prevention of disease, a reduction in the health sector's environmental health impacts and contributing to a longer-term reduction in the population's need for health care. Such an approach can also help to create stable and growing markets for sustainable, locally grown food outside the health care sector.

f. Sustainable food systems typically include the following factors:
   - protect the diversity of both plants and animals (and the welfare of farmed and wild species)
   - avoid damaging natural resources and avoid contributing to climate change
   - respect biophysical and environmental limits in its production and processing, while reducing energy consumption and improving the wider environment
   - support rural economies and the diversity of rural culture, and ideally is produced locally are safe, healthy and nutritious, for consumers

g. By spending in ways that promote sustainable production, the health sector can create stronger local economies, maximizing its contribution to the health and well-being of local populations.

h. To reduce health environmental footprint while contributing to the development of sustainable food systems, fostering healthy eating habits in patients and staff and promoting access to healthy and sustainably sourced food in the community, the following strategies are recommended:

- Purchase and provide healthy sustainable food by implementing a step-by-step program to identify and adopt sustainable food procurement. Begin where minimal barriers exist, and immediate steps can be taken.
- Work with local farmers, community-based organizations and food suppliers to increase the availability and purchase of minimally processed, locally-produced and organic food.
- Modify health facility menus to reduce meat and other animal products and increase plant-forward options. Source foods produced without the use of hormones or antibiotics given to animals or seafood in the absence of diagnosed disease.
- Make the health facility a fast food free zone; eliminate sugar-based soft drinks in hospital cafeterias and vending machines.
- Avoid bottled water and instead serve plain or filtered tap water in reusable jugs or bottles, to minimize transport and packaging waste. Where tap water is not safe potable, provide purified drinking water from large (5 or 10-gallon) reusable bottles.
- Monitor, minimize and beneficially reuse food waste. Test the menu and update it if workers and patients leave food uneaten. Compost/bio-digest food waste, use it as animal feed, or convert cooking oil waste into biofuel.
- Educate and communicate within the facility or health care system, as well as to patients and community, about nutritious, ecologically sustainable, and equitable food production practices.
- Make the facility an access point for healthy and sustainable food by holding farmers' markets for the surrounding community and fostering community gardens on hospital grounds.

CHAPTER 8

SITE SUSTAINABILITY

Chapter 8

Site Sustainability

Green & Safe Health Facilities Manual

Section 17. Health Facility Site Sustainability

17.1 General

a. Sustainable site plan considers the impact of the building on the surrounding environment and its intended occupants. To help reduce the greenhouse gas emissions (GHGs) and to adapt the effects of climate change, site selection and design plays an important role.

b. The land or site upon which will be constructed any building or structure, or any ancillary or auxiliary facility thereto, shall be sanitary, hygienic or safe. In the case of sites or buildings intended for use as human habitation or abode, the same shall be at a safe distance, as determined by competent authorities, from streams or bodies of water and/or sources of air considered to be polluted; from a volcano or volcanic site and/or any other building considered to be a potential source of fire or explosion.[173]

c. Health Facilities can become environmentally sustainable by siting hospitals near public transportation routes, using local and regional building materials, planting trees on the site, and by incorporating design components like day lighting, natural ventilation, alternative energy, water harvesting and green roofs[174] [175]

d. If hospital staff, patients and carers can use public transportation, ride bicycles, or walk to each building, the selection of the site helps reduce the carbon emissions (C02) associated with transportation. This will not only help to reduce air pollution but also promote physical activity.

e. A systematic investigation of the results of ecological survey, or eco-determinants which deal with the relationship of humans, and all attendant forms of life, to the natural and man-made environment, is an essential exercise in awareness. It provides the base and basis for all sound land-use planning of HFs.

17.2 Applicability

17.2.1 This measure applies to all Health (HFs) design of:

a. Government-owned and Private
b. New buildings and their systems
c. Any expansion and/or modification of buildings or systems

17.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

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[173] PD No. 1096, National Building Code of the Philippines

[174] Pencheon D, Cointet S, Brown J, Howley J, Tennison I, Greensmith H, et al. Saving carbon, improving health: NHS carbon reduction strategy. Fulbourn (CB): NHS Sustainable Development Unit (UK); 2009 January. p. 76p. Available from: www.sduhealth.org.uk.

[175] Dhillon, V S. and Kaur, D. 2015. Green Hospital and Climate Change: Their Interrelationship and the way Forward

17.3 Requirements

17.3.1 General Site Context

a. Geographic location, adjacent land use patterns, access system, nearby destinations and facilities, stability or change in development pattern.

b. Political jurisdictions, social structure of the locality, population change in surrounding areas.

c. Ecological and hydrographic system of the region.

d. Nature of the area economy, other proposals or projects nearby and their effects on the site.

e. To adopt the development controls indicated in the National Building Code of the Philippines to establish the extent of the health facility site can develop
   - Measurement of Site Occupancy
   - Percentage of Site Occupancy
   - Total Open Space within lot
   - Impervious and unpaved surface areas

17.3.2 Site Selection Process

When selecting HFs site, the following must be considered:

- Local climate
- Previous development of the site
- Infrastructure and public transportation connected to the proposed HFs
- Species in the area that uses the site as habitat that may be affected
- Nature of the street life in the area and its contribution to the community
- Area where people live and work and how they get back and forth
- Relocation plan for HFs that compliance to Site Sustainability is not possible.
- Alignment to DOH guidelines on master site development for HFs.
- Connection and linkage to the local bioregion, watershed, and community;

Soil condition of the site shall:

a. Determinant of foundation schemes and Soil bearing test must be confirmed at key points:
   1. Closest to the location of basement, if any
   2. Tallest structure in the complex, including water reservoir and sewage treatment plant
   3. As required by the structural engineer

b. Ideally, the subsoil should be such that conventional, economical structural design, and foundation schemes can be used; and

c. Waterlogged areas, swamps, and former rice fields should be avoided.

If no other site available, the following must be considered:

a. Check bearing capacity of the soil;
b. Scrap unstable top layers, if necessary and fill with well compacted, suitable materials; and
c. Seek engineering advice

- Sustainable HFs project must serve more than its immediate function. It must also meet the needs of the local community, support active street life, promote healthy lifestyles, provide ecosystem services, and create a sense of place.

17.3.3 Site selection and design

a. It plays important roles in both reducing greenhouse gas emissions and helping projects adapt to the effects of climate change.

b. If people can use public transportation, ride bicycles, or walk to the hospital building, the project helps reduce the carbon emissions associated with commuting.

c. A project that is connected to the community by pedestrian paths and bicycle lanes encourages people to walk or bike instead of drive, not only helping to reduce air pollution, but also promoting physical activity[176.]

17.3.4 Site and Impact Checklist

a. Sustainable design projects must start in one of two ways, either the team starts with a site, considers the best functions and uses that for location, or the team starts with a function and determines the best location for that land use.

b. Formulation of a list of site data is required to guide the collection of original and existing information.

17.3.5 Biophilic Design: Healing through the Built Environment

a. Biophilia is humankind's innate biological connection with nature. It helps explain why a garden view can enhance our creativity; why crackling fires and crashing waves have captivate effects; why shadows and heights instill fascination and fear; and why animal company and strolling through a park have restorative, healing effects.

b. Biophilic design can reduce stress, improve cognitive function and creativity, improve our well-being and expedite healing. As the world continues to be urbanized, biophilic design becomes essential for providing

[176] US Green Building Code, 2014

people with healthy spaces for working and living. It is being championed as a good strategy to address stress at the workplace, student performance, patient recovery and other health and well-being challenges.

c. In hospital design, sunlight and a view to nature was believed to be important because beautiful setting restored patients to a more natural balance of the senses.[177] Also, the healing power of a connection with nature was established by Roger Ulrich's landmark study comparing recovery rates of patients with and without a view to nature.[178]

d. Biophilic design is divided into three categories: Nature in the Space, Natural Analogues, and Nature of the Space. These categories provide a framework for understanding and enabling thoughtful incorporation of a rich diversity of strategies into the built environment. Each category has its own patterns which lays out the tools for understanding design opportunities.

- Nature in the Space

  It addresses the direct, physical and ephemeral presence of nature in a space or place. This includes plant life, water and animals, as well as breezes, sounds, scents and other natural elements. Common examples include potted plants, flowerbeds, bird feeders, butterfly gardens, water features, fountains, aquariums, courtyard gardens and green walls or vegetated roofs.

- Natural Analogues

  It addresses organic, non-living and indirect evocations of nature. Objects, materials, colors, shapes, sequences and patterns found in nature, manifest as artwork, ornamentation, furniture, décor, and textiles in the built environment. Mimicry of shells and leaves, furniture with organic shapes, and natural materials that have been processed or extensively altered (e.g., wood planks, granite tabletops), each provide an indirect connection with nature: while they are real, they are only analogous of the items in their "natural" state.

- Nature of the Space

  It addresses spatial configurations in nature. This includes our innate and learned desire to be able to see beyond our immediate surroundings, our fascination with the slightly dangerous or unknown; obscured views and revelatory moments; and sometimes even phobia inducing properties when they include a trusted element of safety.

[177] Sternberg, 2009
[178] Ulrich, 1984

17.3.6 Biophilic design patterns and biological responses[179]

This design illustrates the functions of each of the 14 Patterns[180] in supporting stress reduction, cognitive performance, emotion and mood enhancement and the human body. Biophilic design reduces stress, enhances creativity and clarity of thought, improves our well-being and expedites healing. The world population continues to urbanize, these qualities are ever more important.

Categories of Biophilic Design and its Patterns

A. Nature in the Space

1. Visual Connection with Nature: A view to elements of nature, living systems and natural processes.

2) Non-Visual Connection with Nature: Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.

3) Non-Rhythmic Sensory Stimuli: Stochastic and ephemeral connections with nature that may be analyzed statistically but may not be predicted precisely.

4) Thermal and Airflow Variability: Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.

5) Presence of Water: A condition that enhances the experience of a place through the seeing, hearing or touching of water.

6) Dynamic and Diffuse Light: Leveraging varying intensities of light and shadow that change over time to create conditions that occur in nature.

7) Connection with Natural Systems: Awareness of natural processes, especially seasonal and temporal changes characteristic of a healthy ecosystem.

B. Natural Analogues

8) Biomorphic Forms and Patterns: Symbolic references to contoured,

[179] 14 Patterns of Biophilic Design, Improving Health and Well-Being in the Built Environment, Terrapin Bright Green, LLC https://www.terrapinbrightgreen.com/reports/14-patterns/#biophilia-in-context

[180] https://www.terrapinbrightgreen.com/reports/14-patterns/img/fourteenpatterns-table.pdf

patterned, textured or numerical arrangements that persist in nature.

9) Material Connection with Nature Material and elements from nature that, through minimal processing, reflect the local ecology or geology to create a district sense of place.

10) Complexity and Order: Rick sensory information that adheres to a spatial hierarchy similar to those encountered in nature.

C. Nature of the Space

11) Prospect - an unimpeded view over a distance for surveillance and planning.
12) Refuge - A place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.

13) Mystery - The promise of more information achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment.

14) Risk/Peril - An identifiable threat coupled with a reliable safeguard.

With the objective of assuring a suitable site for hospitals, other recommended approaches in site developments can be also considered, such as:

➢ Native vegetation

- A cost-effective measure by which to reduce municipal costs and improve environmental benefits is to have native planting.
- Native planting conserves water and eliminates the need for pesticides and chemical fertilizers.
- Native plants grow well together—they evolved growing alongside one another—and to predictable sizes.

- As indicated in the Rule VII of the National Building Code of the Philippines, the Open Space or sufficient surface for vegetation should be 50%. But, the required percentage for vegetation (unpaved surface area) of the site may vary, depending on the type of occupancy and the lot configuration.

➢ Porous paving

- Porous pavement allows rainwater to seep through the surface to a subsurface layer, where it may be absorbed into the ground or stored.

- This increases groundwater recharge, reduces pollutants in storm water runoff and helps to alleviate flooding and contamination to streams.

➢ Bio-swales

- A landscape swale designed as a water filter, to remove silt and pollution from surface runoff water.

- It consists of a swale drainage course with gently sloped sides (less than 6%) and filled with vegetation, compost and / or riprap.

- It is typically planted with hardy grasses and moisture-tolerant plants and wildflowers.

- The water's flow path, winding within the wide and shallow ditch, is designed to maximize the time water spends in the swale, which aids the trapping of pollutants and silt.

➢ Rainwater harvesting

- This is the collection and storage of rain from roofs or from a surface catchment for future use.

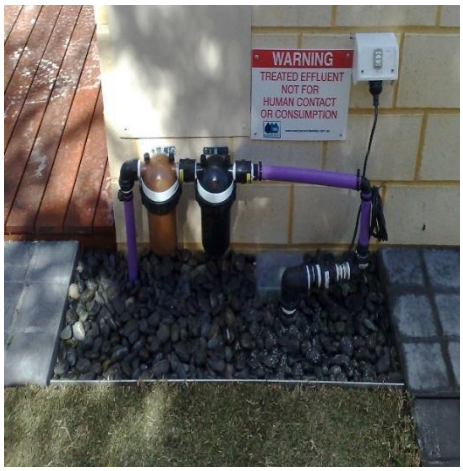
- The water is generally stored in rainwater tanks or directed into mechanisms that recharge groundwater.

➢ Graywater Systems

- Fresh water is a precious resource. Its uses should be restricted to potable water. Any water that has been used once, except water from toilets, is called

graywater.

- It can be reused for many other purposes, especially landscape irrigation. Plants thrive on used water containing small bits of compost. Dish, shower, sink, and laundry water comprise 50-80% of residential "waste" water.



  - The benefits of graywater recycling include:

    i. Lower freshwater uses and related costs of supply.
    ii. Less strain on septic tanks or treatment plant capacity.
    iii. Graywater treatment in topsoil is highly effective.
    iv. Less energy and chemical use.
    v. Reclamation of otherwise wasted nutrients, helping to improve land fertility.

➢ Water-saving fixtures

- Water costs can be significantly reduced. Taking simple water saving measures can save fresh water.

- About 70% of the total water used in the home and offices is for toilet flushing, laundry and baths.

- Water- saving fixtures are standard options on such appliances, indicated by energy star ratings.

➢ Energy efficiency integrated design and HVAC systems.

- If promoted as part of an environmental outreach program, it can enhance the reputation of the organization including the public's increasing concern with global warming.
- Energy efficiency counteracts continually increasing energy costs; HVAC energy efficiency projects can improve the facility's overall operational efficiency. Integrated design lowers HVAC size and rating and results in a less intrusive indoor environment for patient and staff.

➢ Process Water Efficiency

- Process water represents the largest component of facility water use.
- Water efficiency improves long-term facility.
- Operational efficiency, proven technologies available and well-tested

17.3.7 Green HFs Site Parameters

a. Highest and Best Use of Site

The proposed green site guidelines, when pitted against other possible plans, must represent the best future state for all stakeholders. Benefits and trade-offs corresponding to different land use mixes will have to be identified to select the package that will result in the highest best beneficial return

b. Conformity to Sustainable Site Planning, Design Standards and Site Maintenance

Proposed green site guidelines must fall within the provisions of site, building and development laws. They should also be at par with generally-accepted sustainable site planning principles.

c. Site Suitability/ Mitigated Environmental Impacts

The guidelines must consider the type and level of design interventions and must be within the site's carrying capacity. Measures geared at minimizing harmful effects of the development on the physical and social environment must be laid out.

d. Sustainable Landscaping. The following are the recommendations for a Green Landscape Plan:

- Sustainable Landscaping Plan. The main purpose of any sustainable landscape plan in a hospital site is to provide or support water resource protection. When combined with urban ecology programming, the sustainable landscape plan serves not only as a demonstration of the benefits of environmentally responsible landscape design, but also as a tool of instruction for urban site development in general. Sustainable or green features in landscape design are generally cost- effective. In some cases, they have been found to be lower cost than conventional landscaping.

- Landscape Plan. The Plan should illustrate how the following principles of sustainable landscaping and site design might apply to the entire site.

- Natural and Cultural Conservation
  Remediate / reuse valued site and building features.
- Water Retention and Filtration
- Use porous paving and tree structural cells to reduce runoff.

- Practices of sustainable landscaping and site design

  - Planted swales and water-retaining cells (structural soil cells) at tree basins will store rainwater for native tree and plant landscaping.
  - A rainwater retention (harvesting) system.
  - Incorporate the following elements of green infrastructure:
    -Native planting
    -Tree planting/urban forestry
    -Structural soil cells
    -Porous paving
    -Bioswales/rain gardens
    -Rainwater harvesting

e. Program

- Promote water conservation education as well as urban ecology education.
- Provide long-term options for program additions.

f. Sustainable Site Design / Recommendations Design Approach

- Storm water facility design
- Soil medium for storm water facilities

g. Planting Plan

- The planting plan has been developed utilizing template examples and plant selections as found in the area or locality
- Placement and density of material may require adjustment based on final facility design, as well as plant availability or substitutions.

h. Irrigation

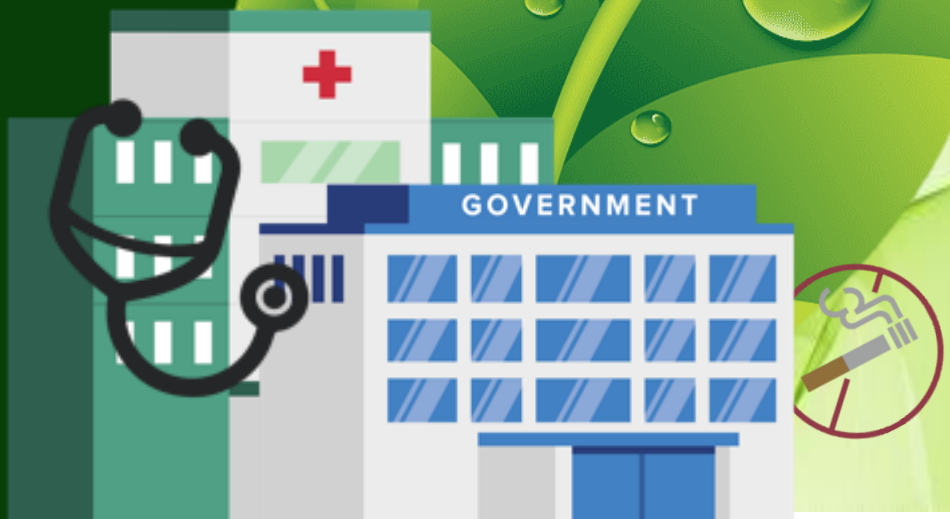
- An irrigation system shall be designed by others to meet requirements.

i. Non-Storm Water Plantings

- All landscape areas, other than basin, swales and planters shall be planted with trees, shrubs or groundcover. These areas shall receive a hemlock bark mulch cover.
- There shall be no turf grass areas on site. It is assumed that grassed areas are permissible adjacent to street within the site right-of-way.

CHAPTER 9

INDOOR ENVIRONMENTAL QUALITY



Chapter 9

Indoor Environmental Quality

Green & Safe Health Facilities Manual

Section

Section 18. Health Facilities Indoor Environment Quality

18.1 General

a. Indoor Environmental Quality (IEQ)[181] encompasses the conditions inside a building—air quality, lighting, thermal conditions, ergonomics—and their effects on occupants or residents. Strategies for addressing IEQ include those that protect human health, improve quality of life, and reduce stress and potential injuries. Better indoor environmental quality can enhance the lives of building occupants, increase the resale value of the building, and reduce liability for building owners.

b. The DOH Administrative Order 2009-0010[182] entitled Rules and Regulations Promoting a 100% Smoke Free Environment aims to protect the population from the damaging effects caused by tobacco smoke by promoting a comprehensive 100% Smoke-Free Environment and encourage LGUs to actively ensure 100% Smoke-Free Environment. This shall adopt a 100% Smoke-Free Environment Policy in all health facilities, hospitals and all DOH-attached agencies nationwide and shall recommend the adoption of this policy to all LGUs and private health facilities nationwide.

c. The Philippine Green Building Code declares that Indoor Environmental Quality (IEQ) requires the adoption of efficient design and operation practices that take into consideration the building environment to improve occupant health, productivity and safety. The IEQ must be consistent with Integrated People Centered Health Services. Section 15 of the Philippine Green Building Code covers the Minimum Fresh Air Rates (sub-section 15.1).

- Table 16 of GB Code, Minimum Ventilation Rates in Breathing Zone, does not include institutional category (i.e. hospitals) other than Educational Institutions (schools). This effectively excludes hospitals and other health facilities in the coverage of the Code as far as the sub-section on Minimum Fresh Air is concerned. However, some provisions of Table 16 Minimum Ventilation Rates in Breathing Zone may be used for hospitals and other health facilities.

d. Notwithstanding, in reference to the DOH Memorandum Circular No. 2017-0018[183] entitled Executive Order No. 26 from the Office of the President entitled "Providing for the Establishment of Smoke-Free Environments in Public and Enclosed Places", where scientific evidence has unequivocally established that tobacco consumption and exposure to tobacco smoke cause death, disease and disability, lead to devastating health, social, economic and environmental consequences, and places burdens on families, on poor, and on national and local systems. It is also observed to have “No Smoking” signage posted in conspicuous spaces within the health facility.

e. DOH Administrative Order 2020-0047[184] in its Environmental Management for Primary Care Facilities shall ensure that the environment is safe for its patients and staff, including the general public that there shall be a “No smoking policy” and the same shall be strictly enforced.

[181] USGBC, 2014, Green Building 101: What is indoor environmental quality?, https://www.usgbc.org/articles/green-building-101-what-indoor-environmental-quality

[182] DOH Administrative Order 2009-0010, Rules and Regulations Promoting a 100% Smoke Free Environment

[183] DOH Memorandum Circular No. 2017-0018, Executive Order No. 26 from the Office of the President entitled Providing for the Establishment of Smoke-Free Environments in Public and Enclosed Places

[184] DOH Administrative Order No. 2020-0047, Rules and Regulations Governing the Licensure of Primary Care Facilities in the Philippines

f. According to Bernheim, several major factors affect indoor air quality: the quality of the outside air, the location of outside air intakes, construction materials, furnishings, equipment, filtration and ventilation efficiency, occupants, and maintenance.[185]

18.2 Applicability

18.2.1 This measure applies to all Health Facilities (HFs) design of:

a. Government-owned and Private
b. New buildings and their systems
c. Any expansion and/or modification of buildings or systems

18.2.2 These guidelines shall not be used to circumvent any applicable safety, sustainable, health or environmental requirements.

18.3 Requirements

IEQ is defined in the Philippine Green Building Code as the conditions inside the building that includes air quality, access to daylight and views, pleasant acoustic conditions, and occupant control over lighting and thermal comfort. Parameters of IEQ can be culled from this definition. The Code, however, does not identify the various indicators of the IEQ parameters, hence the following IEQ parameters and their corresponding indicators are recommended.

18.3.1 Parameters

Pertains to the essential technical data to be considered in establishing and maintaining quality and ideal environment for health facility in relation to the following conditions:

18.3.1.a Thermal quality

- Outdoor Air Temperature (deg. C)

  As the outdoor temperature increases, the desirable room temperature in an air-conditioned space increases.

Temperature Range (deg. C)[186]	
Cold	< 10
Cool	> 10 < 15
Temperate	> 15 < 27
Hot	> 27 < 38
Very Hot	> 38

- Room Temperature (deg. C)

  The ideal temperature of an airconditioned space for hospital area with ease or for a patient to be comfortable. Temperature standards are given as either a single temperature or a range, depending on the specific health-care zone. Cool temperature standards (20°C–23°C) usually are associated with operating rooms, clean workrooms, and endoscopy suites. A warmer temperature (24°C) is needed in areas requiring greater degrees of patient comfort. Most other zones use a temperature range of (21°C–24°C). Temperatures outside of these ranges may be

[185] NCBI, Green Healthcare Intitutions: Health, Environment, and Economics, https://www.ncbi.nlm.nih.gov/books/NBK54149/

[186] Manual of Technical Guidelines for Hospital Planning and Design 100-Bed Hospital, 2015

needed occasionally in limited areas depending on individual circumstances during patient care (e.g., cooler temperatures in operating rooms during specialized operations)[187].

- Relative humidity (%RH)

  This is the ratio of the measured partial pressure of the water vapor in the air mixture to its saturation pressure at the same dry bulb temperature.

Relative Humidity Ranges (%RH)[188]	
Very Dry	0 to 25
Dry	25 to 50
Humid	50 to 75
Very Humid	75 to 100

- ASHRAE Standard 170 Design Parameters[189]

This represents the minimum design standards for facilities and gives specific minimum requirements for space design temperatures and humidities as well as ventilation recommendations for comfort, asepsis, and odor control in spaces that directly affect patient care.

Function of Space	Pressure Relationship to Adjacent Areas	Minimum Outdoor ach*	Minimum Total ach*	All Room Air Exhausted Directly to Outdoors	Air Recirculated by Room Units	Design Relative Humidity,%	Design Temp. °C
Operating room	Positive	4	20	NR*	No	20 to 60	20 to 24
Emergency department public waiting area	Negative	2	12	Yes	NR*	max. 65	21 to 24
AII rooms	Negative	2	12	Yes	No	max. 60	21 to 24
Patient room	NR*	2	4	NR*	NR*	max. 60	21 to 24

*ach = air changes per hour, NR = no requirement.

Air Conditioning in Disease Prevention and Treatment[190]

- Patients exhibiting thyrotoxicosis (related to hyperthyroidism) may be more sensitive to hot, humid conditions or heat waves (Pearce 2006).
- Extreme ambient heat is a public health threat, especially for the elderly and persons with preexisting health conditions (Richard et al. 2011).
- Cardiac patients are often unable to maintain the circulation necessary to ensure normal heat loss. Air conditioning cardiac wards and rooms of cardiac patients, particularly those with congestive heart failure, is necessary and considered therapeutic (Burch and Pasquale1962).
- Individuals subjected to operations and those with barbiturate poisoning may be susceptible to hypothermia (Belani et al. 2013). HVAC systems may reduce this risk.
- Symptoms of rheumatoid arthritis are correlated to humidity of the environment (Patberg and Rasker 2004). Some have suggested the benefit of dry environments (less than 35% rh).
- Dry air increases the difficulty in terminally cleaning spaces and causes particles to remain airborne for longer periods of time. Pathogen transmission through the air is

[187] Guidelines for Environmental Infection Control in Health-Care Facilities. U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC). 2003. Atlanta, Georgia, USA

[188] Manual of Technical Guidelines for Hospital Planning and Design 250-Bed Hospital, 2017

[189] 2019 ASGRAE Handbook – HVAC Applications, Chapter 9, Health Care Facilities

[190] 2019 ASGRAE Handbook – HVAC Applications, Chapter 9, Health Care Facilities

greater when the air is dry, and infectious particles travel deeper into the lungs when they are small. Cilia in the respiratory system, which are responsible for clearing particulates out of the bronchial tubes, have reduced function in dry conditions. Dry air also leads to cracks in the skin and increased cortisol production.

- Clinical areas devoted to upper respiratory disease treatment and acute care are often maintained at a minimum of 30% rh. The foundation and associated clinical benefit of this practice have recently come under question, so the designer is encouraged to closely consult the latest design guidance and the facility owner when establishing this design criterion.
- Exposure to dry environments may have a negative impact. Taylor (2016) found an increase in the number of healthcare associated infections in patients in a medical-surgery wing and in an oncology wing when the relative humidity dropped below 40% rh.
- Patients with chronic pulmonary disease often have viscous respiratory tract secretions. As these secretions accumulate and increase in viscosity, the patient's exchange of heat and water dwindles. Under these circumstances, inspiration of warm, humidified air is essential to prevent dehydration (Walker and Wells 1961).
- Patients needing oxygen therapy, those with tracheostomies, and other mechanically ventilated patients require warm, humidified air (Jackson 1996). Cold, dry oxygen or bypassing the nasopharyngeal mucosa presents an extreme situation. Rebreathing techniques for anesthesia and enclosure in an incubator are special means of addressing impaired heat loss in therapeutic environments.
- Warm, moist air has been shown to be beneficial in treatment of burn patients (Liljedahl et al. 1979; Zhou et al. 1998). A ward for severe burn victims should have temperature controls (and compatible architectural design and construction) that allow room temperatures up to 32°C db and relative humidity up to 95%.
- Reducing hospital-acquired infections (HAIs; also called nosocomial infections) is a focus of the healthcare industry. It is difficult to draw any general conclusions about HVAC's contributions or ability to affect infections (DeRoos et al. 1978; Jacob et al. 2013).

18.3.1.b Visual quality[191]

- General Illumination (LUX)

  The luminaries are usually arranged in a symmetrical plan fitted into the physical characteristics of the area and blend well with room architecture.

- Natural daylight

  The presence of daylight enters through windows, its horizontal directivity provides good modeling shadows, minimal ceiling reflections and excellent vertical surface illumination.

- Standby light

  The installed reserve lighting equipment in excess of that required which is a reliable support or source to carry peak load. It is also recommended the use of renewable energy/energy efficiency lights.

[191] Manual of Technical Guidelines for Hospital Planning and Design 100-Bed Hospital, 2015

- Lighting System

The lighting system shall be designed for expected activity. The task shall be analyzed in terms of difficulty, duration, criticalness and location in order to determine the lighting needs throughout the space, always keeping in mind that higher illumination levels than necessary are likely to waste energy while on the other hand, levels lower than needed could impair visual effectiveness.

Table 11
Lists of the recommended illuminance levels[192]

TASK	MIN. & MAX (LUX)	APPLICATIONS
Lighting for infrequently used for	50 – 150	Circulation areas and corridors
	100 – 200	Stairs
Lighting for working interiors	200 – 300	Infrequent reading and writing
	300 – 750	General offices, typing and computing, conference room
	500 – 1000	Deep-plan general and drawing offices
Localized lighting for exacting tasks	500 – 1000	Proofreading
	750 – 1500	Designing, architecture and machine engineering
	1000 – 2000	Detailed and precise work

18.3.1.c Acoustic quality

- Acceptable Sound Level (db)

The level that must be observed in a particular area to achieve the acoustical requirements in order that the activities involved may proceed unhampered.

Table 12
Recommended Category Classification for background Noise Level[193]

TYPE OF SPACES	ACOUSTICAL REQUIREMENTS	ACCEPTABLE EQUIVALENT NOISE LEVEL RANGE (db)
Intensive care areas, recovery areas	Quiet surrounding must be maintained	20 to 30
Large meeting and conference rooms	For good listening	35 to 40
Bedrooms, sleeping quarters, wards, private rooms	For sleeping, resting and relaxing	35 to 45

[192] Guidelines on Energy Conserving Design of Building
[193] Manual of Technical Guidelines for Hospital Planning and Design 100-Bed Hospital, 2015

Table 12 (continued)

Private and semi-private offices, small conference, classrooms, libraries	For good listening	40 to 45
Lounging areas and similar spaces	For conversing	45 to 55
Large offices, reception areas, cafeterias, dining	For moderately good listening conditions	45 to 60
Lobbies, laboratory work spaces, general secretariat areas	For fair listening condition	50 to 55
Office, equipment rooms, kitchens and laundry areas	For moderately fair listening	55 to 70
Shops, parking, power plant control	For acceptable speech communications	70 to 110

- Acoustic Privacy

  Provide acoustic privacy in patient rooms, offices and examination rooms with partitions of sound transmission class (STC) of 45.

  Isolate mechanical equipment for vibration and prevent noise from pipes, elevators, and other building services.

18.3.1.d Indoor Air Quality[194][195]

1. The air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants. Understanding and controlling common pollutants indoors can help reduce your risk of indoor health concerns.
2. Inadequate ventilation can increase indoor pollutant levels by not bringing in enough outdoor air to dilute emissions from indoor sources and by not carrying indoor air pollutants out of the area. High temperature and humidity levels can also increase concentrations of some pollutants.
3. Outdoor Air intakes should be located as far as is practical (on directionally different [i.e., compass directions] exposures whenever possible), but not less than 7.6m, from combustion equipment stack exhaust outlets, ventilation exhaust outlets from the hospital or adjoining buildings, medical/surgical vacuum systems, cooling towers, plumbing vent stacks, smoke control exhaust outlets, and areas that may collect vehicular exhaust and other noxious fumes. Air intakes should be located at least 9 m from any Class 4 air exhaust discharges as defined in Standard 62.1-2010. The bottom of outdoor air intakes serving central systems should be located as high as practical (minimum of 3.7 m recommended) but not less than 1.8 m above ground level or, if installed above the roof, 1 m above the roof level.

[194] United States Environmental Protection Agency (EPA), 2017, Introduction to Indoor Air Quality

[195] 2019 ASGRAE Handbook – HVAC Applications, Chapter 9, `ties

4. Air Filters remove contaminants from the air. High-efficiency filters should be installed in the system, with adequate facilities provided for maintenance and in situ performance testing without introducing contamination into the delivery system or the area served. Also keep in mind maintenance workers' safety. High-efficiency filters are expensive. Energy costs associated with the pressure drop can be 70% of the total cost of ownership.

18.3.2 IEQ Guideline in HFs

a. Four basic related needs of patients, carers, visitors and health care workers: physical comfort, social contact, symbolic meaning, and wayfinding[196].In the admitting and discharging area, it is recommended that patient privacy be considered when getting personal information[197].

Minimum Consideration for Hospital Areas

- Emergency Care Areas
  - Separate entrances for ambulances and walk-in patients.
  - Registration facilities should be designed for privacy.
  - Use different finish materials for different sections i.e., resilient surfaces in waiting area, hard easily maintained surfaces for heavy traffic.

- Waiting areas
  - Use adequate and comfortable seating.
  - If possible, provide several high-backed chairs for geriatric patients
  - Colors should be pleasant and cheerful.
  - If possible, provide natural light and pleasant views.
  - If possible, use a combination of overhead, recessed, and indirect lighting (artificial skylight can simulate the feel of natural daylight).
  - Provide ample trash receptacles, vending machines, access to telephones and restrooms.
  - Outdoor waiting areas can be provided to supplement indoor waiting areas.

- Treatment area
  - If decontamination room/area is provided, drainage system and sewer connections must be designed to handle hazardous material.
  - A holding tank system must be included to collect hazardous waste for later disposal.
  - There should be provision for handling biological and radioactive hazards.
  - It should have an independent, filtered ventilation and exhaust system.

- Hospital Diagnostic Imaging Departments

  - Waiting and reception area
    - Keep ambulatory waiting room separate from patient-holding area (for inpatients).
    - If possible, provide natural light and view outside.

[196] Chapman Grant Associates
[197] Skaggs, HKS, Inc.

- Carpeting, upholstered seats, artworks, and pleasant wall finish/covering can contribute to a feeling of well-being.

- Holding area
  - Should be separate from the ambulatory waiting room.
  - Provide chairs and space for wheelchair and stretchers/gurneys.
  - Natural light if available should be exploited.
  - Cheerful wall covering and wall art works can have a soothing effect.
  - Consider ceiling murals for lying patients.

- Dressing area
  - Should be segregated from ambulatory waiting area.
  - Provide comfortable seating.
  - Secure place for clothing and mirror.

- Procedure rooms
  - In windowless areas, backlit photomurals or artificially illuminated stained glass artwork can alleviate feeling of claustrophobia.
  - Patient toilet facilities should be adjacent and available to the imaging room.

- Diagnostic imaging
  - Configure to separate out- patient and in-patient flow.
  - Provide individual dressing rooms adjacent to the procedure room.
  - For reading room, use non-reflective finish for walls and work surfaces.
  - Design friendly and non-threatening environments.
  - Provide positive distractions such as artworks, view to outdoors, aquarium to relieve patient stress and anxiety.
  - Use reflected ceiling lighting in areas where patients will be lying down on stretchers or procedure tables.

- Surgery Facilities
  - Finishes for procedure room should be as non- porous as possible.
  - Floor and wall materials should be applied as seamlessly as possible.
  - Materials must be able to withstand repeated washings with harsh germicidal cleaners.
  - Select materials that can be heat-sealed seamlessly.
  - Floor-wall junction should be curved to facilitate cleaning.
  - Top surfaces of cabinets should be sloped for ease of cleaning.
  - General (ambient) room lighting must be coordinated with task lighting to provide maximum visibility in wound area with glare free illumination for the surgical team/staff.

- Operating room environments
  - Provide 20 to 25 air changes per hour (ventilation system).
  - Provide air filtration systems that achieve 90% efficiency (ASHRAE Standard 52-76).
  - Maintain 65 degrees to 75 degrees Fahrenheit temperature with relative humidity of between 50 and 55%.
  - Humidity standard can be reevaluated with the adoption of non-flammable

anesthetics (lower humidity is less conducive to bacterial growth).
  - Provide positive pressure of about .0005 inches of H2O relative to the surrounding area to ensure only filtered air, not ambient air enters the operating room.
  - Provide clean wound infection rate of less than 1 to 2 percent.
  - For high-risk intervention, use of ―clean room technology that require extraordinarily contaminant-free environment is recommended
  - Use of laminar airflow clean air systems rather than conventional plenum air-handling systems may be considered (panel systems with laminar flow can avoid potential for contamination with low return registers, two per room, on opposite walls or corners as minimum).

- Laser surgery
  - Walls must not be reflective (avoid high-gloss epoxy- based paints).
  - Tile or vinyl works should have buff finish in medium tones rather than light colors.
  - Walls must be free from glass or windows which can reflect and bounce the laser beam.
  - Laser procedure rooms for eye surgery must not be subject to vibration.

- Recovery room
  - Avoid bold colors and harsh and irritating lights to make recovery more pleasant.
  - Provide natural light when possible.
  - Light levels should be relatively low and soothing indirect light. Approximate natural light instead of fluorescent lights for better skin tone evaluation.

- Critical Care Facilities (ICU, CCU)
  - Provide windows and natural illumination as much as possible.
  - Patients in intensive care units without windows were more than twice as likely to develop delirium than those who occupied windowed rooms[198] avoid harsh lighting (from fluorescent fixtures), provide lights that can be dimmed to correspond to the body‘s circadian rhythms.
  - Ceiling materials should avoid glare and provide interesting texture to help promote a sense of orientation for intensive care patients who are mostly lying on their backs; provide privacy without isolating the patient.
  - Avoid patient sight-line to life support and monitoring devices (use of wall-mounting and column- mounting equipment may be considered)
  - If possible, general lighting should be indirect rather than direct light.
  - Since it is common in critical care facilities to have noise levels ranging from 45 to more than 90 decibels and noise levels exceeding 30 decibels may be incompatible with sleep, the appropriate decibel level should be provided.

- Patient Care Unit / Inpatient Care Facilities
  - Patient room should be humane environment which include privacy, dignity, peace and quiet, sense of being observed in case help is needed, cleanliness, security, diversion and entertainment, isolation from other patients when required, company of other patients when appropriate, interesting area of

[198] Wilson,1772

ambulation, tangible goal outside the patient room to encourage ambulation, access to shower and bath, easy access to lighting, bed, and television controls, easy access to phone, easy access to nurses' call signal, accessible place for personal belongings, accommodation for visitors, good glare free light, view to the outside, aesthetics and pleasing environment.[43]

- Design patient rooms as a place of sanctuary, privacy, and safety where patients and family are given control of their environment.
- Integrate gardens, provide views, use warm lights, provide family-support space
- Design for ease of wayfinding, and communications, control of light, sound, temperature, and privacy, ability to connect with nature through windows and gardens or hallways linked to courtyards, restful, hospitable and inviting spaces.
- Provide space for needed family amenities while visitors need generally do not conflict with those of patients, unlike the needs of nursing staff which may conflict with the patient's needs for privacy, freedom of choice, and peace and quiet, appropriate configurations should be provided.
- Security may conflict with patient's sense of freedom and choice; appropriate configurations should also be provided.
- Maintenance operations should not conflict with patient or staff space or activities.

- Electrical systems
  - For inpatient units, provide power to maintain critical operation during power interruptions or disasters and ensure adequate supply of on-site fuel for emergency power generation.
  - Provide redundancy of supply from power company on two separate feeders, if possible, from two separate main transformer locations.

- Clinical Laboratory:
  - Use chemical and stain resistant materials for laboratory work tops and cabinet finishes.
  - Use bacteria resistant and cleanable finishes in all areas.
  - Provide negative pressure and dedicated exhaust system.
  - Provide special water supply (reverse osmosis), dedicated dilution-basin and acid waste and ventilation system.

- Health care- related design for aging population, elderly and PWD

Shall be in conformity of the Accessibility Law (BP 344)[199], DOH Administrative Order No. 2017-0001 entitled Policy Guidelines on the Standards of Care for Older Persons in All Health Care Settings, DOH Department Circular No. 2020-0226 entitled Technical Guidelines for Geriatric Ward Planning and Design for Health Facility Setting and other relevant laws.

- Use large, clear letters for signage. Avoid lighting the background of signs.
- If floors are color-coded, avoid blues, greens, and neutral colors.
- Provide higher illumination levels and diminishing glare.
- Avoid uneven lighting; Design acoustically optimal environments that

[199] https://www.ncda.gov.ph/disability-laws/implementing-rules-and-regulations-irr/irr-of-bp-344/

incorporate sound absorbing materials.

- Provide ample seating, with arms for ease in sitting and rising.
- Enhance wayfinding and orientation.
- Provide ample handrails.
- Provide adequate door widths for wheelchair use.
- Use easily operated lever-type door hardware.
- Ensure adequate wheelchair turnaround space in small rooms.
- Provide ramps throughout for wheelchair access
- Use surface texture changes on walks adjacent to hazard areas (tactile warning strips.

b. HVAC engineering controls, such as required differential pressure relationships between spaces, directional airflow, methods of air delivery, air filtration, overall building pressurization, etc., directly contribute to maintaining asepsis. Well-designed HVAC systems also affect indoor environmental quality and asepsis integrity through specifically HVAC related factors (e.g., thermal comfort, acoustics, odor control).

c. Territory and personal space in the hospital environment is important for a sense of privacy.[200] Privacy is a primary concern of patients discharged from hospitals[201].

d. Since public and administrative areas are usually located at main entrance they can serve as point of orientation for the facility.

[200] Friedman, ed., 1963

[201] Press, Ganey Associates, Inc., 1992

Chapter 10

Final Provisions

Green & Safe Health Facilities Manual

Section 19. Amendment Clause

The DOH, through its appointed office, may introduce modifications in this Green Manual through the amendment of specific provisions as the need arises. Any amendment to the Manual shall be applicable to projects after the effectivity of the said amendment.

Section 20. Effectivity

This Green Manual shall take effect on September 29, 2021.

Acknowledgments

The **Green and Safe Health Facilities Manual / Green Manual** was developed in response to the global call for a Green and Safe Health Facilities. In 2019, DOH Circular No. 2019-0059 was issued to encourage the use of green building rating system for health facility projects. The Department of Health (DOH) commissioned the expertise of green building practitioners in the Philippines to come up with a framework of this Manual. The World Health Organization (WHO), as a partner of the DOH and as a steward of green and safe design principles and practices in health facility development, hired the services of a Technical Assistance Provider (TAP) to assist DOH in the development of this Manual. The Green and Safe HCF Manual includes the areas of performance standards using reliable references and works of technical experts approved by DOH. The Manual was presented to various green building practitioners to gather their technical inputs. This was subsequently presented to technical experts from the academe, private sector, NGOs, DOH and WHO for discussion and finalization. In consideration to their invaluable contribution in the development of this Manual, the Department of Health would like to thank the following:

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- Site Sustainability, *Arch. Leah Punongbayan-Dela Rosa*
- Indoor Environmental Quality, *Arch. Luis Ferrer*
- Hospital Safety, *Engr. Aida Calma*

Department of Health

- Health Facility Development Bureau
- Disease Prevention and Control Bureau
- Health Facilities Services and Regulatory Bureau
- Health Emergency Management Bureau
- Health Facilities Enhancement Office

Other government agencies

- Climate Change Commission
- Department of Public Works and Highways
- Provincial Health Office, Laguna
- Sanitation Division, Manila City Health Office

- Professional Regulation Commission

Hospitals and other Health Facilities

- Quezon Memorial Medical Center
- Amang Rodriguez Memorial Medical Center
- San Lazaro Hospital
- San Lazaro Hospital
- Heart Center of the Philippines
- San Lazaro Hospital
- Corazon Locsin Montelibano Memorial Regional Hospital

Academe

- Technological Institute of the Philippines, Quezon City
- Westmead International School, Batangas City
- National University, Manila

NGOs

- Philippine Green Building Council
- Philippine Society of Sanitary Engineers
- Philippine Society of Sanitary Engineers
- Healthcare Without Harm

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Annex 1. Green Viability Assessment Tool

Instruction:

The Green and Safe (Climate Smart) Management in the Facilities:

To ensure compliance to the requirements indicated in this Green and Safe Health Facility Manual of the engineering and administrative units of hospitals and other health facilities (HF), all HFs may be evaluated by administering the survey questionnaire “Green Viability Assessment Tool”. The tool shall be administered by the designated Energy Efficiency Officer or duly designated team. This checklist may be used as one of the tools for the continuous improvement and good practices of all HFs until such time that the facilities shall have imbibed such green concepts into their systems.

The assessment tool is answerable by "YES or NO." Kindly provide its rationale or evidence by ticking off each applicable item for the following performance standards. The evidences shall be sent via email at rpmd@doh.gov.ph:

1. Energy Efficiency
2. Water Efficiency, Sanitation and Hygiene
3. Health Care Waste Management
4. Climate Resilient Health Facility
5. Material Sustainability
6. Site Sustainability
7. Indoor Environmental Quality
8. Governance/ Leadership and Management

YEAR	
GENERAL INFORMATION ABOUT THE HOSPITAL	
Date:	
Name of Hospital:	
Ownership:	
Classification (General/Specialty):	
Service Capability/Level:	
Licensed Authorized Bed Capacity (LTO ABC):	
Bed Occupancy Rate:	
IBC:	
Contact Number:	Email Address:
Hospital Chief:	
Energy Efficiency and Conservation Officer (EECO):	
EECO Email Address:	
Contact Number (Phone/Mobile):	
Pollution Control Officer (PCO):	
PCO Email Address:	
Contact Number (Phone/Mobile):	
Total number of personnel (Regular and Jos):	
a. Number of clinical staff	
Medical Doctor/s:	
Special Care Areas Nurses:	
Staff Nurses:	
All other Nurses:	
Alied Health Personnel:	
b. Number of nonclinical staff	
Administrative Personnel:	
Janitorial and Security Personnel:	
CTI:	

Physical Distribution

Total Gross Floor Area (TGFA):

Floor Area of each building in the premise/s (attach other sheet if necessary)

Building Number	Building Name	Total Floor Area of the Bldg (sq.m.)

Conducted hammer test/structural analysis within the buildings of hospital: Yes ☐ No ☐

If yes, when:_____, what building:_____ (kindly attach summary of the testing)

Conducted Hospital Safety Index within the building/s of hospital: Yes ☐ No ☐

If yes, when: October 2018, what building: Building 1-36 (kindly attach summary of the report)

Geographical Description

Latitude: **Longitude:**

Total Lot area:

Green Space area:

Conducted soil testing in the hospital premise/s: Yes ☐ No ☐

If yes, when:

Characteristic of location of Hospital

☐ a. Coastal Area
☐ b. Low Lying Area
☐ c. Landslide Prone
☐ d. Mountainous Terrain
☐ e. Others: Low Flood Susceptability

Location / Distance in Kilometer/meter in relation to the following (if applicable):

from the fault line:
from the sea:
from the river bank:
from the creeks:
from major highway:
from the railroad:
from hazardous elements/activity
from oil deposit
from industrial establishment:
other/s: _____ _____

YEAR :						
GENERAL INFORMATION ABOUT THE HOSPITAL						
Information on Energy Consumption						
Date of Last Energy Audit:						
Cost per Kwh in your area:						
Month		**Kwh**		**Php**		
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
TOTAL						
Monthly Average Consumption						
Production/Generation from Renewable Energy (if applicable)						
Type of Renewable Energy (RE) Source: other/s:_____						
If the RE is Solar panel, what is the total area of the panel:						
How much is alloted for the solar panel (equipement and installation):						
Where/What is the REs intended for the hospital operation:						
Month		**Kwh**		**Php**	**O&M Cost**	**Total**
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
TOTAL*						
Monthly Average Generation from REs						
*Remarks:						

Information on Water Consumption		
Cost per cu.m in your area:		
Is there an available water storage/water tank: Y☐ ☐		
If yes, what is the volume of water storage/tank:		
Is there an available water hasvesting: Y☐ N☐		
If yes, what is the volume of water storage/tank:		
Month	**Cubic Meter**	**Php**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average Consumption		
Information on General Waste Collection		
Please attach separate form for this part if needed		
Last Waste Audit:		
Waste collection per kilogram :		
Month	**Kilograms**	**Waste collection fee**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average Genaration		

Information on Hazardous Waste Collection		
Please attach separate form for this part if needed		
Waste collection per kilogram:		
Month	**Kilograms**	**Waste collection fee**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average Consumption		
Information on Waste Water Generated		
Please attach separate form for this part if needed		
Waste collection per cu.M if applicable:		
Month	**Cubic Meter**	
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average Consumption		

Information on Sewage Treatment Plant (STP)		
Please attach separate form for this part if needed		
Waste collection per cu.M if applicable:		
Month	**Cubic Meter**	**Montly cost for the operation of STP**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average Consumption		

Information on Sewage Treatment Plant (STP)		
Please attach separate form for this part if needed		
Waste collection per cu.M if applicable:		
Month	**Cubic Meter**	**Montly cost for the**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average		

Information on Effluent		
Please attach separate form for this part if needed		
Effluent collection per cu.M if applicable:		
Month	**Cubic Meter**	**maintenance**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
TOTAL		
Monthly Average		

ENERGY EFFICIENCY				
Criterion	**Sub-Category**	**Questions**	**Achievability**	**Evidence/Rationale**
Energy and the way it is used is the most significant contributor to climate change. Energy conservation and utilizing renewable energy will be significant factors in making your health facility 'smarter.' Although large specialized pieces of equipment are integral to the health sector, they consume a lot of energy. Significant savings can be achieved by ensuring that all electronic equipment, devices, appliances, and fixtures are certified and labeled as energy efficient	Energy Label and Management	Does the HF equipment and appliances energy-efficiency rated, which follows the presence of a yellow-colored card or tag attached on products or printed on the box with the power consumption, energy efficiency or capacity specified, for the procurement of energy consuming products?		○ copy of pucharse request ○ other/s:
		Has the health facility used light bulbs and electrical devices with more efficient models/types?		○ LED ○ CFL ○ Slim Type Flourescent ○ Copy of Purchase Order: ○ Photo/s ○ other/s:_____
		Does the HF formulate/s an energy efficiency and conservation program/plan to include energy conservation measures, target savings, motor vehicle inventory and other strategies consistent with the Government Energy Management Program (GEMP), as well as compliance to Section 44 and 45 of the EEC-IRR?		○ Hospital Order ○ Other/s: _____
		The HF allocate/s appropriate amounts from its approved annual budget for the implementation of its prioritized and planned energy management program and shall include budget preparation necessary funds for its energy management program.		○ Planning document/s ○ HF Resolution/s ○ Other/s: _____
		The HF designated one (1) Energy Efficiency and Conservation (EE&C) Officer who meets the following minimum requirements to fully address the GEMP's thrust		○ Hospital Order ○ Other/s: _____
	Energy Conservation	Does the HF adopt/use renewable energy strategies as back-up or secondary line for electricity?		○ copy of pucharse request ○ other/s:
		Pursuant to the R.A. 11285 or the Energy Efficiency and Conservation Act, does the health facility conduct Energy Audit and submit report to the Department of Energy every three (3) years?		○ copy of the audit report ○ copy of submission/s ○ other/s:
		Does the HF set-up annual energy targets, energy conservation plan, and methods of measurements and verification for the implementation of energy efficiency and conservation projects?		○ copy of the consrvation energy plan ○ copy of target savings ○ copy of submission/s ○ other/s:
		Does the HF submit an annual energy consumption report and annual energy conservation report to the Department of Energy (DOE), in accordance with the HF annual energy reduction targets?		○ copy of the energy report ○ copy of submission/s ○ other/s:
		Does the HF perform Preventive Maintenance Schedule (PMS) in the facility, service/public health vehicle, and equipment?		○ All PMS accomplished monitoring sheet ○ other/s:
	Natural Ventilation and Building Envelope	Has the Health Facility been planned and designed to maximize the use of natural light to reduce the use of artificial illumination?		○ Hospital Order ○ As-buit plan ○ Other/s: _____
		Did the HF plan and design complete gaskets, weather-stripping, door bottom sweeps and seals within and around window and door assemblies for air conditioned areas?		○ Hospital Order ○ As-buit plan ○ Other/s: _____
		Does your health facility follow the minimum Light-colored building/solar reflectance index (SRI) of 70? (For Health Facility Enhancement Program (HFEP) projects, the unified color scheme must be followed).		○ copy of pucharse request ○ other/s:

WATER EFFICIENCY, SANITATION AND HYGIENE				
Criterion	**Category**	**Questions**	**Achievability**	**Evidence/Rationale**
The health facilities could make use of the following key steps in making their climate-smart: conservation of water, optimization of water use, recycling of treated wastewater, and rainwater harvesting. Without adequate and safe water supply, a health care facility will be difficult to function as a health care facility.	Sufficient and Safe Water Supply	Does the HF conform to the latest Philippine National Standards for Drinking Water, with regard to the sufficient quantities and quality of drinking-water?		○ Copy of water safety plan ○ other/s:_____
		Does the HF conduct water quality testing and regular monitoring as indicated in the Philippine National Standard for Drinking Water of 2017 for all water supplies intended for drinking, cooking, and bathing?		○ Result of the water testing ○ Copy of water management plan ○ other/s:_____
		Has the HF developed and implemented the Water Safety Plan (WSP) to ensure drinking water safety as per DOH AO No. 2014-0027?		○ Copy of water safety plan ○ other/s:_____
		Does the HF have a Rainwater Collection System as an adaptation measure to combact climate change?		○ copy of pucharse request ○ photo/s ○ other/s:
		Does the health facility include safe drinking water, with a guaranteed capacity that would last at least 72 hours to address emergency needs, in addition of the 3-day water reserve?		○ Pillow tanks ○ Bladder tanks ○ Onion Tanks ○ other/s:
	Water Management and Discharge	Do they conduct water audit in the HF to determine qualitative and quantitative analysis of water consumption?		○ Copy of water safety plan ○ Photo/s ○ Copy of record/s ○ other/s:_____
		Are the faucets in the health facilities and plumbing water-efficient (20-60 psi)?		○ Low-flow faucets ○ Dual flush water closet ○ Handheld water bidet ○ Water-saving Shower Head ○ water-efficent lavatory faucet ○ other/s:_____
		Are there management controls like sub-metering and water pressure regulators installed in the water system line?		○ copy of pucharse request ○ photo/s ○ other/s:
		Were they able to utilize available alternative water sources and monitor the use of renewable energy with the HF?		○ Alternative water sources using REs ○ Water management Plan ○ other/s:_____ ○
		Does the HF have an educational program for health care workers and stakeholders that highlights the need to conserve, the efficient use of water and their different water conservation programs?		○ copy of Notice of meeting/Minutes ○ photo/s ○ other/s:
		Does the HF implement harvesting rainwater for watering of plants, cleaning of ambulances/service vehicles, toilet flushing?		○ water gardening ○ flushing toilets ○ other/s:_____
		Does the HF implement reuse treated wastewater for cleaning of ambulances/service vehicles, toilet flushing, and for other non-potable purposes?		○ Copy of water safety plan ○ record/s ○ other/s:_____
	Water, Sanitation and Hygiene (WASH)	Has the HF established environmental cleaning policies that describe the required type and frequency of cleaning for diferrent purposes?		○ Standard Operating Procedures (SOPs) ○ Environmental cleaning policy ○ Other/s:_____
		Does the HF provide sufficient and functional hand hygiene facility, with easy access to soap and water for health workers, patients and carers?		
		The health facilities complies with the requirements of DOH Department Circular No. 2021-0240 entitled Revised Implementing Rules and Regulations of Chapter XVII "Sewage Collection and Disposal, Excreta Disposal and Drainage" of the Code on Sanitation of the Philippines (P.D. 856)		○ Hospital Order ○ Water Safety Plan ○ Other/s: _____
		Is the HF following the Five (5) moments of hand hygiene technique by WHO?		○ Poster on the hand hygiene facility ○ Protocol ○ Picture ○ Other/s:_____
		Without adequate attention to water, sanitation, and hygiene (WASH), universal health coverage will be difficult to attain, has the HF accomplished the Philippine version of the WASH FIT tool?		○ Accomplished WASH FIT improvement plan ○ Copy of score/assessment ○ Other/s:_____

HEALTH CARE WASTE MANAGEMENT				
Criterion	**Category**	**Questions**	**Achievability**	**Evidence/Rationale**
Health care wastes must be properly handled due to many potential hazards in dealing with these wastes such as physical, chemical and biological, as well as other ergonomic factors. Buildings in their current design are similar to boxes that turn resources into wastes. The problem should be solved in the context of sustainability. Surely, a way to achieve this goal is to design and build a green and safe HF or to design and create performance that reduce negative effects on the environment.	Sustainable Health Care Waste Management	Does the HF ensures the protection of the public health and utilize environmentally sound methods to maximize resource conservation and recovery?		○ ensure the proper segregation and collection ○ has a waste storage facility ○ has a transport waste management plan ○ has treatment and disposal of solid wastes ○ other/s:_____
		Is there an available Healthcare Waste Treatment for HF, specifically on the infectious waste?		○ Third party treater ○ Copy of MOA/Agreement ○ On-site HCW treament ○ other/s :
		Does the HF establish a formal health care waste management plan that includes all types of wastes generated in HF, which involves segregation, collection, handling, storage, treatment, and disposal of waste generated from health care activities?		○ HCW Management Plan ○ Minutes of Meeting ○ Other/s: _____
		Has the hospital and other HFs encouraged the use of reusable packaging and to start minimizing the volume of waste upon entry to their facility?		○ Hospital Order ○ Other/s: _____
		In reference to the latest DOH Health Care Waste Management Manual, does the HF conduct orientation to the health care workers regarding the standards, guidelines and protocols stipulated herein?		○ once every 3years ○ once in a year ○ twice or more in a year ○ none
		Is there a waste water treatment plant (WWTP)/sewage treatment plant (STP) present in your facility or is their sewer line connected to Service Providers for waste water?		○ STP/WWTP plans ○ Service Provider Agreement ○ other/s:_____
		To have a positive impact to the Green and Safe HF towards Sustainable HCWM, does the HF implement patient safety, infection prevention and control, and occupational health and safety programs/intervention?		○ Hospital Order ○ Notice of Meeting ○ Minutes of Meeting ○ Other/s:
	Health Care waste Minimization and Recovery	Has the HF accomplised the HCWM assessment tool from the Health Care Waste Management Manual, 4th Edition?		○ Accomplished HCWM tool ○ Other/s: _____
		Does the HF establish proper waste recycling that reduces the demand for new resources, cuts down on the effort of transportation and production?		○ Hospital Order ○ HCWM Plan ○ Other/s: _____
		Does the HF promote and consider the unnecessary use of single-use plastics in the HF and also encourage hospital staff, patients and carers to limit the use of plastics within the facility?		○ Hospital Order ○ Other/s: _____
		Does the HF have a Health Care Waste Storage Area with four compartments, namely: for biodegradable wastes, non-biodegradable wastes, infectious wastes and recyclable waste?		○ two compartments ○ three compartments ○ four compartments ○ other/s:
		Has the HF conducted a formal waste audit?		○ Conducted by external auditor ○ Conducted by facility staff (internal) ○ other/s:

Environmentally Resilient Health Facility				
Criterion	**Category**	**Questions**	**Achievabilit y**	**Evidence/Rationale**
HFs can be capable in anticipating, responding to, coping with, recovering from and adapting to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it All new health facilities will need to consider the following principles of safe, sustainable, and resilient infrastructure, but existing health facilities must also be improved in order to meet the criteria for Climate Resilient Health Facility	Resilient and Environmentally Sustainable Health Facilities	Does your health facility have available hazards map or other hazard information affecting its safety and its role in emergency and disaster?		○ Risk Assessment ○ Hospital Safety Assessment ○ Hazard map ○ Evacuation Map
		Has your HF institutionalized a Disaster Risk Reduction and Management in Health (DRRM-H) plan and organized and trained Health Emergency Response Teams (HERTs)?		○ Hospital Order ○ Minues of Meeting ○ Photo/s of training ○ Other/s:
		Does your HF conduct structural integrity assessment or evaluation before, during and after a natural disater?		○ before the disaster ○ after the disaster ○ during disaster * attach copy
		Does the HF evaluate the capability of HF infrastructure to be able to withstand storms, flooding, disasters and ensures the emergency backup systems that will need to be used during climate related emergencies?		○ Hospital Order ○ Copy of Assessment ○ Photo/s ○ Other/s:
		Is there an on-site renewable energy generation or backup electricity generation on your HF that can power the facility's emergency power needs for at least 48 hours?		○ Type of REs:_____ ○ backup to 24 hours ○ backup to 48 hours ○ backup to 49 hrs or more
	Hospital Safety	Does the HF have preparedness plan that is readily available in the facility?		○ evacuation ○ decontamination ○ security plan other/s: _____
		It is expected for a hospital building to remain standing and functional particularly during and after natural disasters to protect the health of their communities in accordance to DOH Policies and Guidelines on Hospitals Safe from Disasters (DOH-AO No. 2013-0014), has the health facility conducted and accomplished the Hospital Safety Index Tool?		○ Copy of HSI Assessment ○ Copy of record/s ○ Within a year ○ two years ago ○ three years or more
		Does the HF conduct preventive maintenance for safe, clean, emergency water supply, including the rainwater harvesting?		○ once a year ○ twice a year ○ more 2x a year
		Does the HF develop Hospital Response Plan that includes compendium of Standard Operating Procedures (SOPs), involving the actual implementation of procedures for the developed systems, and the provision of life-saving and essential services during or immediately after a disaster?		○ Copy of Hospital Response Plan ○ Copy of SOPs ○ other/s
		Does the HF investigate the conditions of the structural member of the buildings, specifically during prior events and hazards affecting building safety and integrity?		○ Conducts structural testing ○ Conducts vulnerability assessment ○ other/s

MATERIAL SUSTAINABILITY				
Criterion	**Category**	**Questions**	**Achievability**	**Evidence/Rationale**
Resource efficiency promotes more efficient use of resources and sustainable materials are those products that have low embodied energy. The selection of materials and resources used during construction or renovations, as well as the interior furnishings and furniture, offers a significant opportunity to reduce your carbon footprint and overall environmental impact and make your facility 'smart' and 'green.'	Sustainable Green Materials	Is there a proper waste recycling program in the HF that reduces the demand for new resources, and cuts down the effort of transportation and production?		○ Single use of plastics ○ Paper recycling ○ other/s:_____
		Rapidly renewable material has the capacity to regenerate itself in 10 years or less, does the HF consider for the 2.5% of the material as rapidly renewable?		○ Hospital Order ○ Purchase Order ○ Other/s: _____
		Does the HF avoid using building materials/products that contain Toxic Chemicals? (Some of which emit volatile organic compounds causing respiratory, dermatological and other conditions).		○ Hospital Order ○ Purchase Order ○ Other/s: _____
		Does the HF management implement an Integrated Pest Management program?		○ Purchase Order ○ other/s:_____
	Sustainable procurement, food and service	Through proper procurement planning and in compliance to the DOH Department Memorandum No. 2019-0280 Establishment of Green Public Procurement (GPP) System in Health facility, does the HF consider if the materials are environment-friendly in preparing the specifications of their supplies, equipment and other materials?		○ Hospital Order ○ Purchase Order ○ Other/s: _____
		Does the HF purchase supplies that are locally-sourced materials (within 160 km radius of the facility)?		○ atleast 160 km radius ○ more than 160km radius *attached sample Purchase Order
		Does the HF procure at least ten percent (10%) locally manufactured materials for the project?		○ Hospital Order ○ Purchase Order ○ Other/s: _____
		Does the HF purchase and provide healthy sustainable food by implementing a step-by-step program to identify and adopt sustainable food procurement and has the HF developed a sustainable food policy/plan?		○ Hospital Order ○ Food Policy/Plan ○ Other/s: _____
		Does the HF educate and communicate to patients, carers and healthcare workers, about nutritious, ecologically sustainable, and equitable food production practices?		○ Hospital Order ○ Minues of Meeting ○ Photo/s of training ○ Other/s: _____

SITE SUSTAINABILITY				
Criterion	**Category**	**Questions**	**Achievability**	**Evidence/Rationale**
The analysis indicates that the site and space are sufficient enough to accommodate planned functions and/or adequate funds are available to secure the site. Health Facilities can become environmentally sustainable by placing hospital sites near public transportation routes, using local and regional building materials, planting trees on the site, and by incorporating design components like day lighting, natural ventilation, alternative energy, water harvesting and green roofs	Health Facility Site Sustainability	Has the Master Site Development Plan (MSDP) taken into consideration the development of the health facility?		○ As Built Floor Plan ○ MSDP ○ Zoning Plan ○ All of the above
		Has the Health Facility updated or have the latest Health Facility/Hospital Development Plan (HDP)?		○ HDP ○ PIP/TRIP ○ other/s:_____
		The sub-soil shall be tested for conventional, economical structural design, and foundation schemes. Has the HF conducted soil analysis or geotechnical investigation?		○ Copy of Soil testing report ○ other/s:_____
		Public transportation, riding bicycles or walkiing to the hospital building, not only helps reduce air pollution, but also promoting physical activity. Has the HF promoted the use of best public transportation available, as well as the accessibility to patients, staff, and visitors in HFs?		○ nearby public transportation ○ Promotion of bicycles ○ promotes walking ○ Hospital Order ○ Poster/s ○ other/s
	Healing through the Built Environment	Does the HF comply with local and national ordinance (zoning/building permit)?		○ Zoning Permit ○ Building Permit ○ other/s:_____
		A good strategy to addressing stress at the workplace, patient recovery and other health and well-being challenges is biophilic design. Does the HF already integrated biophilic design in the design of the HF?		○ copy of DAED/design ○ Photo/s ○ other/s
		Sustainable or green features in landscape design are generally cost- effective. Has the HF established its sustainable landscaping plan?		○ copy of green landscape plan ○ Photo/s ○ other/s
		Biophilic design can reduce stress, enhance creativity and clarity of thought, improve our well-being and expedite healing, does the health facility promotes this initiative?		Photo/s of the ff: ○ Nature in the Space ○ Natural Analogues ○ Nature of Space
		Has the HF considered and implemented native vegetation?		○ vegetation around HCF ○ used in the dietary area ○ Copy of MSDP / plans ○ other/s:_____
		Has the health facility established proposal on green site guidelines?		○copy of Green Site Guidelines ○ Hospital Order ○ other/s:_____

INDOOR ENVIRONMENTAL QUALITY				
Criterion	**Category**	**Questions**	**Achievability**	**Evidence/Rationale**
Indoor Environmental Quality (IEQ) is important in health facilities because it can negatively impact the health of staff, patients and visitors. IEQ is related to ventilation, which is related to building design, window placement, prevailing winds, and energy use (in cases where mechanical ventilation is used).	Indoor Air Quality	Promoting a 100% Smoke Free Environment aims protect the population from the damaging effects caused by tobacco smoke by promoting a comprehensive 100% Smoke-Free Environment, does the HF adopt the policy of the DOH Administrative Order 2009-0010?		○ Copy of Hospital Order ○ Photos ○ Other/s: _____
		Have your HF provided an entryway system, grills or mats that can capture dirt and particulates brought in from outside the facility?		○ HVAC Plan ○ Photos ○ Other/s:
		Has the Health Facility always promoted good Heating, ventilation, and air conditioning (HVAC) system?		○ HVAC Plan ○ Photos ○ Other/s: _____
		Did the Health Facility consider the protective environment room to have either positive pressure and/or negative pressure, with air exhausted directly to the outdoors?		○ isolation room/s, ○ ICU ○ clinical lab ○ other/s:_____
	Visual Quality	Has the HF installed reserve lightning equipment in excess of that required, which is a reliable support or source to carry peak load?		○ Copy of Purchase Order ○ Photos ○ Other/s: _____
		Do they follow the Window to Wall Ratio (WWR) to maximize the lighting of the health facility? (Please refer to Philippine Green Building Code for WWR)		○ atleast 20% WWR ○ atleast 50% WWR ○ more than 50% WWR
		The lighting system shall be designed for expected activity, does the HF follow the recommended illuminance level?		○ Copy of Hospital Order ○ Photos ○ Other/s: _____
	Thermal Quality and Acoustic Quality	Does the HF maintain the ideal temperature of 20-25 °C of an airconditioned space for hospital area for the ease or for patients to be comfortable?		○ Copy of Hospital Order Other/s: _____
		Does the HF provide acoustic privacy in patient rooms, offices and examination rooms with partitions of sound transmission class (STC) of 45?		○ Copy of Plans Other/s: _____
		Have your HF used shade trees or shading devices on the exterior to eliminate direct sunlight to the building?		○ Copy of Hospital Order ○ Photos ○ Other/s: _____
		Does the noise level in the operational rooms in the hospital follow the minimum noise standards? (Please refer to the Manual of the Technical Guidelines for Hospital Planning and Design).		○ at least 20 db ○ around 21-50db ○ around 51-70db ○ around 70-110 db

Governance				
Criterion	**Sub-Category**	**Questions**	**Achievability (YES/NO)**	**Evidence/Rationale**
Enabling policies are required at national, regional, provincial, district and local health settings to create a positive and supportive policy environment, for adequate green and safe HF and to minimize the health-care associated disease risk to patients, staff and carers and at the same time focus on the safety of the hospital buildings.	Roles and Responsibilities	Is there an identified body or representative with the authority and resources to carry out activities (i.e green and safe HCF committee, Pollution Control Officer, or Energy Efficiency and Conservation Officer)?		○ Hospital Order ○ Other/s: _____
		Are the roles and responsibilities communicated to the stakeholders (i.e. HF management, staff, patients, and/or LGU) towards Green and Safe Environment in Health Facilities (HFs)?		○ Hospital Order ○ Other/s: _____
		To be climate smart, does the HF commit to increase its safety, sustainability and resilience by investing in the performance standards?		○ Letter of Commitment/Request ○ Purchase Order/s ○ Other/s:
		Has the HF initiated that the point person on the green and safe health facility undergo training for green certification?		○ Hospital Order ○ Other/s: _____
	Assessing and Planning	Does the health faiclities have the guidelines or specific issuance based on the guidelines and standards of green and safe health facilities?		○ Hospital Order ○ Other/s: _____
		Do they use any planning tool (i.e. problem-solution tree) to identify problems and analyze the reasons for shortfalls to improve the specific conditions for your healthcare setting?		○ Notice of Meeting ○ Minutes of Meeting ○ Other/s: _____
		Green and safe HF initiatives may be included by implementers in their GAD targets. Is the gender analysis and social inclusion considered in the green and safe HF development at the identification and design stages of projects?		○ ○ copy of hf design other/s:_____
		Does the HF have a monitoring system or has the accomplishment of the green viability assessment tool been conducted annually?		○ Hospital Order ○ Other/s: _____
	Development and Promotion	Is there a training conducted to health care workers for the compliance to green and safe health facilities?		○ Hospital Order ○ Picture ○ Training Design ○ Other/s: _____
		Is there a constant reminder on your HF of the importance of infection prevention and control, patient safety and the routine measures required to achieve it?		○ Hospital Memorandum ○ Communication Plan ○ Other/s: _____