1. INTRODUCTION

Sunway University targets to become a Sustainable Institution of Higher Learning by 2030 embedding the 17 Sustainable Development Goals in our Environmental, Social and Governance (ESG) practices.
Sunway University building and infrastructure are thoughtfully designed and constructed to meet the requirements of Green University Building Certification.

Retro commissioning typically focuses on energy-using equipment such as lighting, air-condition and mechanical ventilation (ACMV), and building controls with the goal of identifying maintenance and operational changes to improve comfort and achieve energy savings. Retro commissioning can increase the energy efficiency of buildings by 5-10% or more.

New expansion and construction of new campus spaces are well designed according to principles of green building.

2. Sunway University – Guidelines for Construction & Retrofitting Green Building

No.	Description
Landscape	
1	Invasive plants shall be removed from the building project site and destroyed or disposed of in a land fill. Invasive plants are not allowed to be planted on the building project site. *2018 International Green Construction Code (IgCC)* *Section 5.3.3.1*
2	To provide vertical greenery system on building facades (eg. podium carpark floors etc.) with ≥ 25% of external wall areas for new building. *GreenRE*
Stormwater Management	
3	To use Siphonic Rainwater Discharge System on roof. *GreenRE*

No.	Description
4	To create and implement an Erosion and Sedimentation Control (ESC) for all construction activities associated with the project. a. Prevent loss of soil during construction by storm water runoff or wind erosion; b. Prevent sedimentation of storm sewer or receiving stream; c. Prevent polluting the air with dust and particular matter. *GBI*
5	The use of tar sealants shall be prohibited in any application exposed to stormwater, wash waters, condensates and irrigation water. *2018 International Green Construction Code (IgCC)* *Section 5.3.4.6*
Architectural, ID & Structural	
Hardscape	
6	Paving materials with a minimum initial solar reflectance index (SRI) of 29. A default SRI value of 35 for new concrete without added colour pigment is allowed to be used instead of measurements. *2018 International Green Construction Code (IgCC)* *Section 5.3.5.1*
7	Open-graded (uniform-sized) aggregate, permeable pavement, permeable pavers, and porous pavers (open-grid pavers). Permeable pavement and permeable pavers shall have a percolation rate of not less than 2 gal/min·ft2 (100 L/min·m2). *2018 International Green Construction Code (IgCC)* *Section 5.3.5.1*
Walls	
8	To use low volatile compound (VOC) paints certified by local certification body (e.g. SIRIM Eco-Label, SGLS, SGBP etc.).
9	Partitioning for office rooms along the window bay areas are not allowed. If partitioning along the window bay area is unavoidable, transparent glass partition is preferred over gypsum board partition.
10	The erection and installation of partition shall not in any way obstruct or impair effective performance of air conditioning system, mechanical and electrical services.

No.	Description
	Roof
11	To provide roofing material with solar reflectance index (SRI): a. Low-Sloped Roof ≤ 2:12, SRI ≥ 64; b. Steep-Sloped Roof > 2:12, SRI ≥ 25. (the SRI values shall be based on a minimum three-year-aged solar reflectance and thermal emittance, as measured in accordance with CRRC S100, and shall be certified by the manufacturer) *2018 International Green Construction Code (IgCC)* *Section 5.3.5.3.*
12	Roofs used to shade or cover parking and roofs over semi heated spaces, provided that they have a minimum initial SRI of 29. *2018 International Green Construction Code (IgCC)* *Section 5.3.5.3.*
13	To provide renewable energy (eg. Solar PV) for building development. *GBI*
	Internal Building
14	Large fan can be introduced at strategic locations to assist in air circulation creating an airy space for the user.
15	Daylight are brought in where needed to reduce the need for artificial light. *GBI*
16	To design building achieving ambient internal noise level (40dBeq) for 90% of NLA. (Architecture partition and M&E equipment consideration) *GBI*
17	To use Non-Chemical Termite Treatment System. *GreenRE*
18	To provide non-chemical water treatment system (serving ≥ 50% of total capacity). *GBI*
19	To use low VOC adhesives and sealant certified by local certification body (eg. SIRIM Eco-Label, SGLS, SGBP etc.). *GBI*

No.	Description
20	To use low volatile compound (VOC) paints certified by local certification body (eg. SIRIM Eco-Label, SGLS, SGBP etc.). *GBI*
21	All luminaires to use high frequency ballasts or LED drives. *GBI*
22	To provide motion sensors for all common area toilets and staircases area. (To manage the motion sensor location and control) *GreenRE*
23	To provide renewable energy (eg. Solar PV) for building development.
24	Lighting in any area within a building that is required to be continuously illuminated for reasons of building security or emergency egress. (- MS 1525: Max 3w/m2 for service illuminance, 20Lux for service area. - Priority of Emergency illumination shall comply to Fire protection code)
M&E	
Plumbing Fixtures and Fittings	
25	Water closets (toilets) - For single-flush, maximum flush volume shall not exceed 1.28 gal (4.8 L). - For dual-flush, the full-flush volume shall not exceed 1.28 gal (4.8 L) per flush. (Subject to Toilet fittings availability and cost) *ASME A112.19.2 or ASME A112.19.14*
26	Urinals - Maximum flush volume, when determined in accordance with ASME A112.19.2/CSA B45.1, shall not exceed 0.5 gal (1.9 L). (Subject to Toilet fittings availability and cost) *ASME A112.19.2 or ASME A112.19.19*
27	Urinals - Maximum flush volume, shall not exceed 0.5 gal (1.9 L). (Subject to Toilet fittings availability and cost) *ASME A112.19.2/CSA B45.1*

No.	Description
28	Public metering self-closing faucet - Maximum water use shall not exceed 0.25 gal (1.0 L) per metering cycle (Subject to Toilet fittings availability and cost) *ASME A112.18.2*
29	Public metering self-closing faucet - Maximum water use shall not exceed 0.25 gal (1.0 L) per metering cycle (Subject to Toilet fittings availability and cost) *ASME A112.18.2*
ACMV Systems and Equipment	
30	Once-through cooling with potable water is prohibited.
31	The water being discharged from cooling towers for air-conditioning systems such as chilled water systems shall be limited in accordance with: - For makeup waters having less than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 5 cycles of concentration. - For makeup waters with more than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 3.5 cycles of concentration. (Exception: Where the total dissolved solids concentration of the discharge water exceeds 1500 mg (1500 ppm/L) or the silica exceeds 150 ppm (150 mg/L) measured as silicon dioxide before the above cycles of concentration are reached.) *2018 International Green Construction Code (IgCC)* *Section 5.3.5.3.*
32	Cooling towers and evaporative coolers shall be equipped with makeup and blowdown meters, conductivity controllers, and overflow alarms in accordance with the thresholds of cooling tower flow through tower > 500 gpm (30L/s). *2018 International Green Construction Code (IgCC)* *Section 5.3.5.3*
33	Cooling towers shall be equipped with efficient drift eliminators that achieve drift reduction to a maximum of: - 0.002% of the recirculated water volume for counterflow towers - 0.005% of the recirculated water flow for cross-flow towers *LEED*
34	To recover condensate water (accounting for ≥ 50% of total AHUs / FCUs) for use as cooling tower make-up water etc. (Connect all the condensate pipe discharge and pump back to cooling tower make up tank)

No.	Description
	GBI
35	To provide Sub-Water Meters for all landscape irrigation, swimming pools, water features, cooling towers, irrigation, common kitchens etc. *GBI & GreenRE*
36	To link all Sub-Water Meters to EMS (Energy Monitoring System) or BMS (Building Management System) for leak detection. (Digital submetering and connect to EMS or BMS) *GBI & GreenRE*
37	To provide Air-Conditioning System with Good or Excellent Energy Efficiency Star Rating (low kWe/ton or high COP). (Different rating and COP from different supplier) *GreenRE*
38	Mechanical systems shall include controls capable of disabling exhaust fans and closing exhaust dampers whenever mechanical intake airflow is discontinued. (Sensor control or interlocking) *2018 International Green Construction Code (IgCC)* *Section 8.3.1.4.1*

Note:

IgCC = International Green Construction Code

GreenRE = Green Real Estate

GBI = Green Building Index

ASME = American Society of Mechanical Engineers

LEED = Leadership in Energy and Environmental Design