

Development of BEAM Plus Data Centres

Stakeholder Engagement Background Reading Materials

1 Introduction

The Building Environmental Assessment Method ('BEAM') is a green building labelling scheme and the BEAM Plus assessment is a leading initiative in Hong Kong to offer independent assessments of building sustainability performance.

BEAM Plus is tailor-made for the high-rise, high-density built environment of sub-tropical climate in Hong Kong, which embraces a range of good practices in planning, design, construction, management, operation and maintenance of building, and is aligned with local regulations, standards and codes of practice. Being one of the most widely used voluntary green building labelling schemes, BEAM Plus, covering the series of BEAM Plus Neighbourhood (ND), BEAM Plus New Buildings (NB), BEAM Plus Existing Buildings (EB) and BEAM Plus Interiors (BI), caters to the diverse needs of stakeholders and provides a fair and objective assessment of a building's overall performance throughout its life cycle.

Data Centre (DC) is a key IT infrastructure for both the Government and the private sector in positioning Hong Kong as a data centre hub. While global actions are calling for energy saving and environmental protection, it is imminent that during the planning, design, construction and subsequent management and operation of data centres to take into consideration the appropriate green practices and measures to help energy saving and environmental protection, since data centres usually require high energy to operate. BEAM Plus DCs aims to reduce the environmental impacts of both new and existing data centres whilst improving quality and user satisfaction, by adoption of the best practices.

2 Objectives of the Project

The objectives of the Project are:-

- i. to add a building type for DC (including new and existing buildings) under BEAM Plus with the relevant assessment methodology and procedures manuals ("BEAM Plus DCs"); and
- ii. to develop a Green Data Centre Practice Guide (hereafter referred to as 'Practice Guide') ; and
- iii. to solicit input, and hence support, from stakeholders on the BEAM Plus DCs and Practice Guide development and promotion.

3 Proposed Assessment Framework

Unlike BEAM Plus New Buildings and Existing Buildings assessments, BEAM Plus New DCs and Existing DCs rating tools are specifically designed for local DCs to recognise DCs owners / building management companies as forerunner of green building management practices, achievable performance and continuous improvement. To encourage more DCs to join the scheme, the design philosophy of the rating tools is simple, handy but representative to quantify the performance of the DCs. Moreover, DCs

should be encouraged to improve overall building green performance by educating, influencing and partnering with their supply chains, occupants and communities.

Table 1 Summary of the Proposed Framework of BEAM Plus DCs

	BEAM Plus New DCs	BEAM Plus Existing DCs
Minimum Requirement:		
Assessed DC must with area not less than 500 m ² ⁽ⁱ⁾	✓	✓
Assessed DC associated function areas must not larger than 25% of floor area under assessment ⁽ⁱⁱ⁾	✓	✓
DC certification area must be separable from other mixed-use elements of the buildings	✓	✓
Existing DCs with at least ONE year of operation data ⁽ⁱⁱⁱ⁾	N/A	✓
Scope of Application:		
Whole Building ^(iv)	✓	✓
Part of building – whole floor ^(v)	✓	✓
Part of building – part of floor ^(v)	✓	✓
Purpose built DCs ^(vi)	✓	N/A
A&A works ^(vi)	✓	N/A
Revitalisation of industrial buildings/ Change of building use ^(vi)	✓	N/A
Existing DCs with building services system upgrades ^(vii)	N/A	✓
Existing DCs with minor renovations ^(vii)	N/A	✓

Minimum Requirement

- i. Typically, DC refers to any space containing banks of data storage equipment (i.e. servers), plus any supporting spaces (e.g. switch rooms, UPS rooms, battery rooms). The primary function of the building must be the physical or virtual storage, management, and dissemination of data and information. The data halls and any related plant space should make up a significant majority of the floor area of the assessed DCs. In addition, the proposed area, i.e. 500 m², is referencing to the definition of Major Retrofitting Works under Hong Kong EMSD Code of Practice for Energy Efficiency of Building Services Installation;
- ii. The limit on associated function areas is referencing to the BREEAM Data Centre 2010 and the definition of DC associated function areas must be the function areas that are directly supporting the operating of DC; and
- iii. The requirement of duration for collecting 1-year operation data (i.e. counted from the completion of Test and Commissioning) is referencing to BEAM Plus EB V2.0.

Scope of Application

- iv. Whole building refers to a purpose-built DC building; and
- v. With the DC certification areas clearly marked and separable from other mixed-use elements of the buildings, DC occupying whole floor/ part of the floor are also eligible for the application of the BEAM Plus DCs certification.
- vi. The definition of “New DCs” refers to the newly installed purpose-built DC, existing building that is intended to be carried out major alteration or addition (‘A&A’) works such as constructing an additional floor and/or replacing the entire façade and revitalisation of industrial buildings or change of building use. These three types of DCs are eligible for the application of the BEAM Plus New DC certification.
- vii. BEAM Plus Existing DCs is applicable to those existing DC which desire to have progressive retrofitting works on their building services systems, i.e. replacing the air-conditioning system in the first year, upgrading the lighting system in the second year and so on.

3.1 Performance Categories

The proposed performance categories for BEAM Plus DCs are summarised at the following table: -

Table 2 Summary of the Proposed Performance Categories of BEAM Plus DCs

BEAM Plus New DCs	BEAM Plus Existing DCs
Integrative Design and Management, IDCM	Management, MAN
Sustainable Site, SS	Site Aspects, SA
Materials and Waste, MW	Materials and Waste Aspects, MWA
Energy Use, EU	Energy Use, EU
Water Use, WU	Water Use, WU
Health and Wellbeing, HWB	Indoor Environmental Quality, IEQ
Innovations and Addition, IA	Innovations and Addition, IA

3.2 Extent of Applications/ Exclusions, Pre-requisites and Bonus Credits

- i. Extent of Applications/ Exclusions
Extent of Applications/ Exclusions specify the applicable credit to different types of DC installation, i.e. Whole building DCs or DCs installed in part of the building.
- ii. Pre-requisites
For some of the environmental aspects, applicant should demonstrate performance is over and above statutory requirement as prerequisite requirement for the award of credits. Consequently, when an assessed issue becomes subject to legislation it will no longer count for the award of credits, and will be amended or deleted in any future revisions of BEAM.

- iii. Bonus credits
Bonus credits of corresponding categories would not count towards the total number of credits available, but would count towards the total number of credits achieved.

3.3 Grading System

- i. Four (4) grades, i.e. Platinum, Gold, Silver and Bronze, for BEAM Plus DCs are proposed which aligning with the BEAM Plus family.
- ii. BEAM Plus New DCs and Existing DCs
The proposed final grading for all projects rated with BEAM Plus New DCs is conditional upon the following:
 - a) Meeting all specified pre-requisites;
 - b) Meeting specified overall percentage (%) of credits; and
 - c) Obtaining the minimum percentage (%) of credits for EU aspect.

Table 3 Grading System for BEAM Plus DCs Certificate

Grade	Overall	EU
Platinum	75%	70%
Gold	65%	60%
Silver	55%	50%
Bronze	40%	40%

- iii. BEAM Plus Existing DCs (Individual Category)
For BEAM Plus Existing DCs (Individual Category Certificate), it is proposed the final grading is conditional upon the following:
 - a) Meeting specified prerequisites of the assessed category; and
 - b) Meeting specified overall percentage (%) of credits achieved in the assessed category.

Table 4 Grading System for BEAM Plus Existing DCs (Individual Category Certificate)

Grade	Overall percentage (%) of credits achieved in the assessed category
Platinum	70%
Gold	60%
Silver	50%
Bronze	40%

- iv. The proposed grading system will be determined subject to the results from the sensitive analysis and feedback from stakeholder engagement exercise.

3.4 Assessment Processes

- i. BEAM Plus New DCs
Applicant shall make the submission with templates and the supporting documentations for all categories to BSL for review and approval. Aligning with BEAM Plus New Building V2.0, both Provision and Final assessment shall be conducted in BEAM Plus New DC Scheme.

- ii. BEAM Plus Existing DCs
Applicant shall make the submission with templates and the supporting documentations for all categories to BSL for review and approval. In order to simplify the assessment process, it is proposed that only Final Assessment shall be conducted in BEAM Plus Existing DCs Scheme.
- iii. BEAM Plus Existing DCs (Individual Category)
Applicant shall make the submission with templates and the supporting documentations for any individual category to BSL for review and approval. Aligning with BEAM Plus Existing Building V2.0 selective scheme, only Final assessment will be conducted.

4 Proposed List of Credits for BEAM Plus DCs

4.1 Proposed List of Credits for BEAM Plus New DCs

Table 5 Proposed credits for BEAM Plus New DCs

INTEGRATIVE DESIGN AND MANAGEMENT (IDCM)		
PREREQUISITE	IDCM P1	SUSTAINABILITY CHAMPIONS - PROJECT
PREREQUISITE	IDCM P2	TIMBER USED FOR TEMPORARY WORKS
	IDCM 1	SUSTAINABILITY CHAMPIONS - DESIGN
	IDCM 2	INTEGRATIVE DESIGN PROCESS
	IDCM 3	LIFE CYCLE COSTING
	IDCM 4	COMMISSIONING
	IDCM 5	SUSTAINABILITY CHAMPIONS - CONSTRUCTION
	IDCM 6	ENVIRONMENTAL MANAGEMENT PLAN AND MONITORING
	IDCM 7	CONSTRUCTION AND DEMOLITION WASTE RECYCLING
	IDCM 8	CONSTRUCTION IAQ MANAGEMENT
	IDCM 9	BUILDING MANAGEMENT MANUALS
	IDCM 10	OPERATOR TRAINING PLUS CHEMICAL STORAGE AND MIXING ROOM
	IDCM 11	DIGITAL FACILITY MANAGEMENT INTERFACE
	IDCM 12	DOCUMENT MANAGEMENT SYSTEM
SUSTAINABLE SITE(SS)		
	Ss 1	GREEN BUILDING ATTRIBUTES
	Ss 2	NOISE CONTROL FOR BUILDING EQUIPMENT
	Ss 3	LIGHT POLLUTION CONTROL
	Ss 4	ECOLOGICAL PRESERVATION/ENHANCEMENT
	Ss 5	URBAN HEAT ISLAND MITIGATION
	Ss 6	IMMEDIATE NEIGHBOURHOOD WIND ENVIRONMENT
	Ss 7	OUTDOOR THERMAL COMFORT
	Ss 8	STORMWATER MANAGEMENT
	Ss 9	DESIGN FOR CLIMATE CHANGE ADAPTATION
MATERIALS AND WASTE (MW)		
PREREQUISITE	Mw P1	MINIMUM WASTE HANDLING FACILITIES
	Mw 1	BUILDING REUSE
	Mw 2	SUSTAINABLE FOREST PRODUCTS
	Mw 3	RECYCLED MATERIALS
	Mw 4	OZONE DEPLETING SUBSTANCES
	Mw 5	REGIONAL MATERIALS
	Mw 6	USE OF GREEN PRODUCTS
	Mw 7	LIFE CYCLE ASSESSMENT

ENERGY USE (EU)		
PREREQUISITE	EU P1	MINIMUM ENERGY PERFORMANCE
	EU 1	LOW CARBON PASSIVE DESIGN
	EU 2	REDUCTION OF CO2 EMISSIONS
	EU 3	COOLING SYSTEM EFFICIENCY
	EU 4	AIR MANAGEMENT SYSTEM
	EU 5	METERING AND MONITORING
	EU 6	RENEWABLE AND ALTERNATIVE ENERGY SYSTEMS
	EU 7	PROCUREMENT OF SUSTAINABLE IT EQUIPMENT
WATER USE (WU)		
	WU 1	ANNUAL WATER USE
	WU 2	WATER EFFICIENT IRRIGATION
	WU 3	WATER LEAKAGE DETECTION
	WU 4	COOLING TOWER WATER
	WU 5	EFFLUENT DISCHARGE TO FOUL SEWERS
	WU 6	WATER HARVESTING AND RECYCLING
	WU 7	WATER METERING
HEALTH AND WELLBEING (HWB)		
PREREQUISITE	HWB P1	MINIMUM VENTILATION PERFORMANCE
	HWB 1	INCLUSIVE DESIGN
	HWB 2	ENHANCED VENTILATION
	HWB 3	ACOUSTICS AND NOISE
	HWB 4	INDOOR VIBRATION
	HWB 5	INDOOR AIR QUALITY
	HWB 6	THERMAL COMFORT
	HWB 7	ARTIFICIAL LIGHTING
	HWB 8	BIOLOGICAL CONTAMINATION
INNOVATIONS AND ADDITIONS (IA)		
	IA 1	INNOVATIVE TECHNIQUES

4.2 Proposed List for BEAM Plus Existing DCs

Table 6 Proposed credits for BEAM Plus Existing DCs

MANAGEMENT (MAN)		
PREREQUISITE	MAN P1	GREEN PURCHASING PLAN
	MAN 1	EHS AND ENERGY MANAGEMENT SYSTEM
	MAN 2	ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) DISCLOSURE
	MAN 3	BEAM PROFESSIONAL
	MAN 4	STAFF TRAINING AND RESOURCES
	MAN 5	BUILDING AND SITE OPERATION AND MAINTENANCE
	MAN 6	BUILDING SERVICES OPERATION AND MAINTENANCE
	MAN 7	ELECTRONIC OPERATION AND MAINTENANCE PLATFORM
	MAN 8	IAQ MANAGEMENT FOR RENOVATION
SITE ASPECTS (SA)		
	SA1	GREEN BUILDING ATTRIBUTES
	SA2	NOISE POLLUTION
	SA3	LIGHT POLLUTION
	SA4	HEAT ISLAND REDUCTION
	SA5	GREEN ROOF
	SA6	AMENITIES FOR OPERATION AND MAINTENANCE

SA7 BARRIER FREE ACCESS**MATERIALS AND WASTE ASPECTS (MWA)**

PREREQUISITE	MWA P1	WASTE RECYCLING FACILITIES
PREREQUISITE	MWA P2	MATERIALS PURCHASING PLAN
	MWA 1	MATERIALS PURCHASING PRACTICES
	MWA 2	USE OF CERTIFIED GREEN PRODUCTS
	MWA 3	OZONE DEPLETING SUBSTANCES
	MWA 4	WASTE MANAGEMENT PLAN

ENERGY USE (EU)

PREREQUISITE	EU P1	MINIMUM ENERGY PERFORMANCE
	EU 1	ENERGY MANAGEMENT
	EU 2	ENERGY ANALYSIS
	EU 3	COMMISSIONING
	EU 4	ENERGY BENCHMARKING AND IMPROVEMENT
	EU 5	ENHANCEMENT

WATER USE (WU)

	WU 1	WATER EFFICIENT DEVICES
	WU 2	COOLING TOWER WATER
	WU 3	WATER RECYCLING
	WU 4	WATER SAVING PERFORMANCE
	WU 5	WATER METERING
	WU 6	WATER EFFICIENT FLUSHING SYSTEM

INDOOR ENVIRONMENTAL QUALITY (IEQ)

PREREQUISITE	IEQ P1	MINIMUM VENTILATION PERFORMANCE
	IEQ 1	VENTILATION IN COMMON AREAS
	IEQ 2	LOCALISED VENTILATION
	IEQ 3	THERMAL COMFORT IN AIR-CONDITIONED PREMISES
	IEQ 4	BIOLOGICAL CONTAMINATION
	IEQ 5	IAQ MONITORING
	IEQ 6	INTERIOR LIGHTING IN NORMALLY OCCUPIED AREAS
	IEQ 7	INTERIOR LIGHTING IN AREAS NOT NORMALLY OCCUPIED
	IEQ 8	ROOM ACOUSTICS
	IEQ 9	NOISE ISOLATION
	IEQ 10	VIBRATION

PERFORMANCE ENHANCEMENTS AND ADDITIONS (IA)

	IA 1	INNOVATIVE TECHNIQUES
	IA 2	PERFORMANCE ENHANCEMENTS
	IA 3	PROVISION OF ELECTRICAL VEHICLE CHARGING STATIONS

5 Proposed Framework for Green Data Centres Practice Guides

5.1 Scope of Application

- i. The practice guides should be applied to all types of DCs, including both the newly purpose-built and existing DCs.

5.2 Applicability of Expected Practices

It is understood that not all DC users will be able to implement all of the expected practices and measures in the DCs due to physical, logistical, planning, control, responsibility or other constraints. In these instances, the types of users should be defined in the Practice Guides and each of the users should identify the types of Operators that best describes their responsibility within the DC for which they can apply the most suitable practices under their areas of control.

- i. Types of Operators
The types of DC users and the corresponding description are summarised in Table 7: -

Table 7 Types of Operators

Type	Description
Developer	Owns the entire DC from the physical building, building services system, to the consumption of the IT equipment and services delivered.
Operator	Operates the entire DC from the physical building through to the consumption of the IT services delivered.
Colocation Provider	Operates the DC for the primary purpose of selling space, power and cooling capacity to customers who will install and manage their own IT hardware and services.
Colocation Customer	Owns and manages IT equipment located in a DC in which they purchase managed space, power and cooling capacity.
Managed Service Provider	Owns and manages the DC space, power, cooling, IT equipment and some level of software for the purpose of delivering IT services to customers.

It is expected that different types of operator will have different level of control of DC facilities, each proposed practice will be specified with area of responsibility to indicate the applicability of the practices to the operator.

5.3 Areas of Concern

- i. The best practices and measures introduced cover the whole life cycle of the DC including, Design, Procurement, Operation & Maintenance and Disposal.
- ii. The proposed green DC practice covers five (5) common areas of concern in DC facilities, including HVAC system & Air Flow Management, Power system, Lighting System, Metric & Benchmarking and IT System.

5.4 Proposed Contents of the Practice Guides

i. Green Data Centre Design

Under this section, the proposed best practices are focused on the design stage of the DC facilities and are applicable to Developer, Operator and Colocation provider. It is expected that some of the measures, in particular for IT Systems, are also applicable to Colocation Customer and Manage Service Provider, on the issue of design, selection and deployment of IT System and Equipment.

ii. Green Data Centre Procurement

Under this section, the proposed best practices are focused on the Procurement stage of the DC development and are applicable to Developer, Operator, Colocation provider, Colocation Customer and Manage Service Provider.

iii. Green Data Centre Operation & Maintenance

Under this section, the proposed best practices are focused on the Operation & Maintenance (O&M) stage of the DC and are applicable to Operator, Colocation provider, Colocation Customer and Manage Service Provider. The Plan, Do, Check, Act approach (Deming Cycle) is suitable for optimising the DC systems to improve operational effectiveness and to achieve energy reduction and saving.

iv. Green Disposal

Discussion of the waste management issue in Hong Kong is more critical than before. Apart from general refuse, disposal of electronic equipment, i.e. obsolete IT equipment and data centre facilities, are expected to have huge environmental impact, therefore, green disposal practices shall be developed to minimise environmental impact on the disposal of obsolete electronic equipment.

Best practices shall therefore cover on the overall life cycle of DC. At the design stage, best practices on the development of Green Disposal policy, practice, plan and facility for IT equipments will be addressed. At the Operational and Maintenance stage, measures on monitoring and auditing of the waste policy and performance will be addressed. Operational process on handling waste disposal on IT equipment within DC are one of the key focus. It is expected that the best practices and measures shall also echo the government policy on Proper Recycling of Regulated Electrical Equipment Turning Waste into Resources.