Pre-Design

Design

Construction

Operation

CEPAS

Comprehensive Environmental Performance Assessment Scheme for Buildings

Application Guidelines

2006 Edition

ARUP

屋宇署 BUILDINGS DEPARTMENT

Comprehensive Environmental Performance Assessment Scheme for Buildings

CEPAS Application Guidelines

Buildings Department
HKSAR Government

2006 Edition

CONTENT

PREFACE

Thank you for reading this CEPAS Application Guidelines.

The CEPAS **Application Guidelines** forms one part of the holistic life-cycle considered Comprehensive Environmental Performance Assessment Scheme (CEPAS) for buildings in Hong Kong. It is for use in conjunction with the CEPAS assessment manuals for Pre-design, Design, Construction and Operation Stages. The target users for these publications are building developers, owners, designers, contractors, planners, operators, building environmental specialists, i.e. all parties of the building industry. The general public is also encouraged to use this scheme to understand more about building environmental issues. It is expected that the building performance will be improved when all the users are involved.

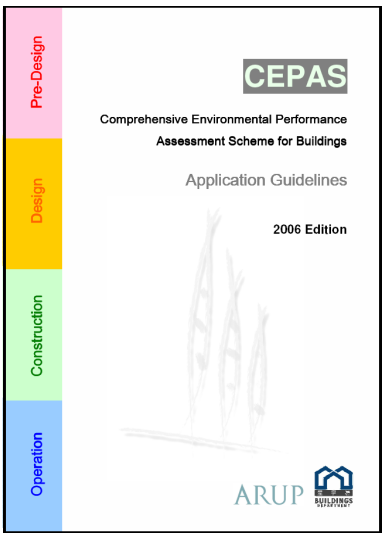
The entire CEPAS assessment scheme consists of the following publications:

- CEPAS Application Guidelines
- CEPAS Pre-design Assessment Manual
- CEPAS Design Assessment Manual
- CEPAS Construction Assessment Manual
- CEPAS Operation Assessment Manual

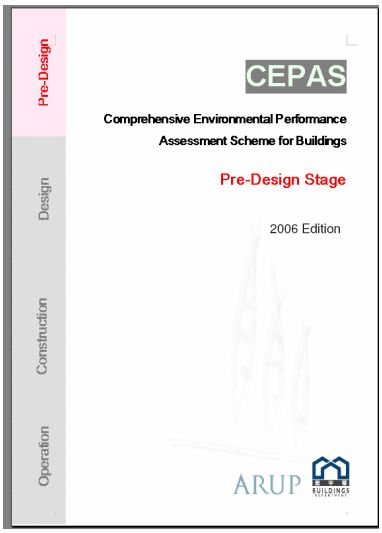
The CEPAS manuals are prepared to provide a measure to evaluate the sustainability performance for all building types in Hong Kong. It is recommended to use this assessment scheme with reference to related guidelines from local and international academia, professional organisations and the Government.

These CEPAS manuals were written by Ove Arup & Partners Hong Kong Limited and the associated sub-consultants. The scheme has incorporated advices from local experts and the Steering Group members, issues raised in the Discussion Forum and Expert Panels, as well as findings of Questionnaire Survey to the stakeholders. The CEPAS assessment schemes, application guidelines and other codes, handbooks and information published by the Buildings Department can be downloaded at http://www.bd.gov.hk/.

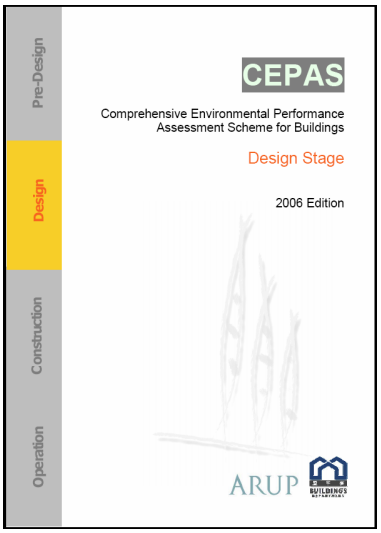
December 2006



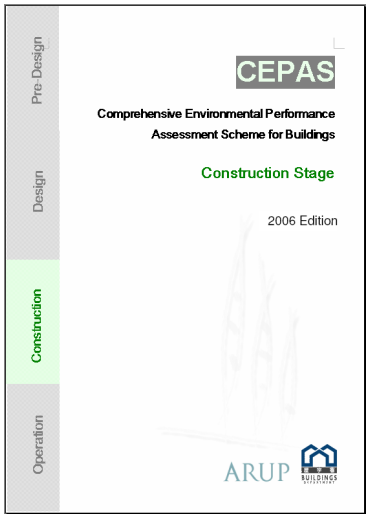
CEPAS Application Guidelines



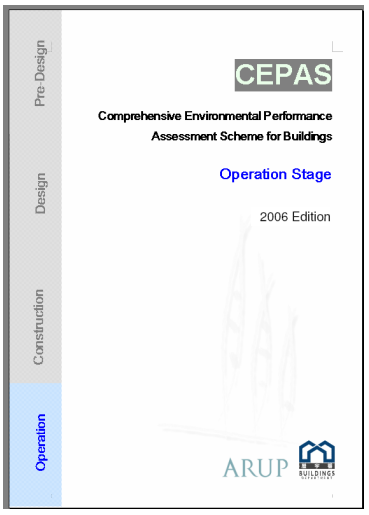
Pre-design Stage Assessment Manual



CEPAS for Design Stage Assessment Manual



Construction Stage Assessment Manual



Operation Stage Assessment Manual

5 Publications of CEPAS for Buildings

INTRODUCTION

1.1 Objectives of CEPAS for Buildings

The Comprehensive Environmental Performance Assessment Scheme (CEPAS) for Buildings is a holistic assessment tool for various building types with clear demarcation of the entire building life-cycle, which covers the pre-design, design, construction & demolition and operation stages. The ultimate goal of implementing CEPAS is to create a positive shift on the current environmental performance of buildings in Hong Kong, as well as to keep in line with the global trend of building sustainability.

1.2 Background

With the increasing awareness of our deteriorating natural and built environment, demand for environmental friendly and sustainable buildings is rising. It is required to develop a standard yardstick in Hong Kong in determining the comprehensive environmental performance of buildings. The unique environmental, ecological, social, cultural, economical and technological conditions in Hong Kong are pertinent to its sustainable development and therefore, it is necessary to devise an assessment scheme that is specifically adapted to Hong Kong in order to deal with the local context.

The Comprehensive Environmental Performance Assessment Scheme (CEPAS) was initiated under the 2001 Government Policy Objectives to form a green building labeling scheme. In this connection, the Buildings Department has commissioned a consultancy study to prepare a user-friendly and comprehensive CEPAS for assessing buildings in Hong Kong. Ove Arup and Partners Hong Kong Ltd, together with local overseas experts and the associated sub-consultants have been commissioned to undertake the consultancy study.

In the early stage of the CEPAS study, a detailed review of 11 major existing and developing local and overseas assessment schemes, as well as the local and global sustainability context of building development was conducted. CEPAS has been tailor-made as a comprehensive building environmental assessment schemes addressing globally recognised sustainable elements formulated for the unique environment and building conditions in Hong Kong. Since comprehensiveness is one of the major characteristics of CEPAS, the CEPAS assessment framework was formulated in line with the latest global trends on sustainable building assessment schemes, and incorporated with new concept developed from consultant team, such that this robust framework is different compared with some established local and international assessment schemes.

CEPAS for buildings endeavours to address both physical and human related issues amongst the core aspects of sustainability. While emphasis on the traditional environmental performance, such as energy, indoor air quality, maintenance of building services installations, CEPAS will have a similar weighting as to other social-economic related factors, such as impacts on the surroundings, communal interactions, building economics, transportation, heritage conservation, etc.

1.3 Scope of CEPAS

There is a general consensus among the stakeholders during the development of CEPAS that sustainability at building level should be encompassed in CEPAS assessment. There are many worldwide objectives relating to planning and design for sustainable building development and its neighbourhood. The application objectives together with assessment indicators define the framework and approach for CEPAS to assess sustainability at the building level. The CEPAS framework is derived to suit the Hong Kong context after careful evaluation of existing schemes and international experience.

As concluded from the SUSDEV 21 study (Sustainable Development for the 21st Century of the HKSAR), it was evident that interpretation of what constitutes sustainable development is wide ranging. Towns and cities are the foremost places where people live and work, not just for individuals but also for the communities. Hence, relevant elements of sustainability should be embedded in the built environment

such that long-term building environmental performance can be improved.

Sustainability consists of three aspects – environmental, social and economic. Relevant and applicable indicators under each aspect are considered in the formulation of CEPAS. Environmental sustainability for CEPAS includes reduction of resources use, use of renewable energy, as well as minimization of environmental loadings and impacts. Social sustainability can be incorporated into buildings by considering aspects like inclusion, access, amenities, user comfort and satisfaction, health and welfare, equality and etc. Economic perspective includes the holistic building life cycle consideration, energy and material cost, buildability and serviceability, and so on.

Sustainability is the element embedded in the assessment scheme. Issues of broader sense of sustainability are to be integrated into all CEPAS categories and indicators, extending environmental sustainability to social and economic aspects.

1.4 Local Building Issues

Hong Kong has a unique compact urban context of high-rise, high-density and with most of the population lives in a very limited buildable land. This creates a number of environmental problems, one of which is noise and air pollution, and the problem is particularly severe for highly condensed urban areas. The compact urban form has caused significant impacts to the design of buildings and their surroundings, which affecting the buildings environmental performance as well as creating social and economic implications. Most new buildings tend to be developed to maximum permissible potential, which of a fairly high density. This crowded built environment reduces the potential for the surrounding buildings to access the sun, daylight and wind. It also incurs visual impacts and creates problems such as lack of privacy.

Hong Kong is a high resource-consuming city though virtually all resources including energy fuel, water and building materials are imported abroad or the Mainland. In pursuit of higher standard of lifestyles attention to the environment is often neglected. Local practices such as demolishing buildings for redevelopment well before their design life rather than refurbishment has worsened the situation and created considerable amounts of waste. Little amount of this waste is reused for building construction. The environmental loadings as a result of increasing energy consumption for better indoor comfort are also contributing to climate degradation.

Our indoor environmental quality in certain buildings may not conform to international standards. For example, the indoor air quality of some existing office buildings cannot satisfy the health requirements due to insufficient supply of fresh air from the air conditioning systems. This results in a higher degree of sick building syndrome problems.

Very often, even modest efforts to mitigate the adverse effect caused by high household density and neighbourhood density could help to improve the environment. Provisions of site and neighbourhood amenities are considered important in providing a good quality of living. Site amenities should be provided comprising open areas, greenery, landscapes, communal facilities and related issues. Attempts should be made to integrate the buildings with the existing urban environment and neighbourhood amenities, such as providing public convenience and encourage inclusion of healthy and disabled people. Sustainable development shall provide a harmonious environment for every community in this society.

The building industry in Hong Kong is important to the local economy. It captures a large part of the GDP growth and consumes large amount of energy and resources. However, the construction industry has also caused many environmental problems during construction and generated large amount of waste during demolition of buildings. Indeed, there is room for improvement in terms of technology and efficiency in current construction industry.

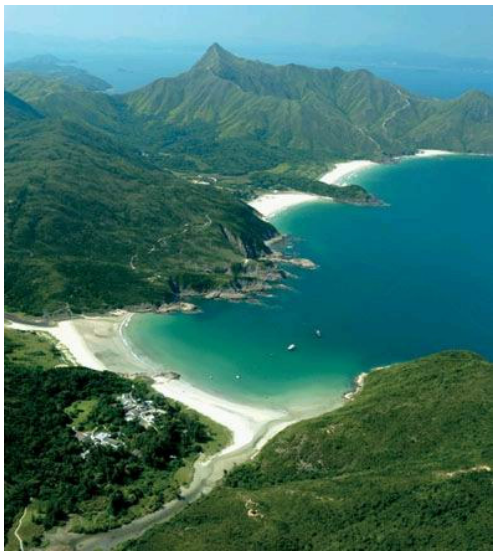
In Hong Kong, for most of the large scale and high-rise developments considerable efforts are required in operation, management and maintenance to maintain the quality and

performance of building fabric and facilities were implemented. Effective building management, higher environmental quality, communication between the building operator and building occupants, building owners' active participation, are important to provide a better building quality and operating performance.

Life-cycle analysis (LCA) of building components is an important consideration for sustainable development. This primarily assesses the environmental impacts of components from origin to final disposal, such as steel produced from mining the raw ores, smelting process to forming, transport, erection and disposal of the steel. Although internationally recognised LCA methodologies exist, the assessment details for the local context depends on the availability of a local LCA database. Relevant local surveys are underway as a result of Government initiatives, such as the current EMSD Life Cycle Energy Analysis study and LCA/LCC study by Hong Kong Housing Department. Although it is not possible to adopt the local LCA-based method at this moment, CEPAS acknowledge that the field is moving on this track. The CEPAS framework is formulated to allow incorporation of local LCA indicators for building components when standardised assessment methods and database for local use become available.

In summary, CEPAS for buildings is formulated to address the current local urban context, resources, indoor environment, social, economic and management issues for the adoption by the building industry and the general public. It is envisaged that, by raising the awareness of the public and re-focusing the practices of the building professionals, the overall living standard and environmental performance in Hong Kong could be improved.

1.5 Global Building Issues



Since 1950 the world population has increased by more than double. This has led to rapid growth of demand from the environment to provide natural resources for human activities and to absorb wastes. The profound demographic shift due to continuous migration from rural to urban areas imposes social-economic and environmental pressures to the urban areas. Optimisation of the rise in population to environmental carrying capacity is necessary. Hence a sustainable approach to future building design and site planning is required.

Developed countries and regions dominate economic activities and energy consumption in the world, and a significant proportion of resources are imported from developing countries. Resolving the uneven distribution of energy consumption in terms of geographical area and population as well as their economic status is a key factor. Annual global emissions of carbon dioxide have continued to increase, and subsequent global warming and climate change have complex and uncertain impacts to the global environment. Global freshwater consumption increased significantly in the past decade, and about one-third of the world's population already live in countries with moderate to high water stress.

For the global communities, purchasing power and living standard are increasing and improving related to economic growth. However, the lifestyle of the public and building occupants at present is environmentally wasteful and inefficient. Efforts should be taken to enhance building environmental education, increase resource use efficiency, reduce waste generation, and introduce recycling concepts to the public.

Hong Kong, as an international city with more than 6 millions population, cannot ignore global environmental issues in the CEPAS. The air pollutant dispersed from the Pearl River Delta and global warming are examples, which demonstrate the regional and global environmental interactions. Hence, influential and relevant global issues in the context of sustainability are important elements to formulate within the framework of this scheme that embraces the required building environmental issues.

Agenda 21 on Sustainable Construction was developed by the International Council for Research and Innovation in Building and Construction (CIB), an international collaboration on research and innovation in building and construction. The notions and issues raised in the CIB Agenda 21 for sustainable construction can be considered as an initial global blueprint for building environmental performance.

Many similar guidelines on building environmental performance have been published in North America, Europe and elsewhere, e.g., Sustainable Building Technical Manual by the US Green Building Council,

BDP Environmental Design Guide from Australia, and numerous guides published by the Building Research Establishment, UK.

The building industry is likely to be scrutinized and required to develop approaches and practices, which addresses immediate environmental concerns and adhere to the emerging principles of sustainability. Within this context, it will become increasingly important to understand how well or poorly buildings perform, and to relate this performance to building users in order to benchmark progress in improving performance. Building environmental assessment methods have emerged as means to evaluate the performance of buildings across a broad range of environmental considerations against an explicit set of criteria.

The past decade , there was a rapid increase in the number of building environmental assessment methods in use world-wide. Many countries and regions either have, or are in the process of developing domestic assessment methods. In the early stage of the CEPAS formulation process, 11 international and local assessment methods have been reviewed which offered useful reference in the development of CEPAS. The latest developments of various building environmental assessment schemes as well as the strength and weakness in the schemes were critically evaluated.

The assessment schemes reviewed are either relatively mature and have a track record of achievement, or are newly introduced or planned for country-wide/region-wide introduction. They included Building Research Establishment Environmental Assessment Method, UK (BREEAM), National Australian Building Environmental Rating Scheme, Australia (NABERS), Leadership in Energy and Environmental Design, US (LEED™), Green Building Tool, Canada (GBTool), Comprehensive Assessment System for Building Environmental Efficiency, Japan (CASBEE), Green House Evaluation Manual - Assessment Handbook for Ecological Residential Building, PRC (中國生態住宅技術評估手冊), Evaluation Manual for Green Building in Taiwan, Taiwan (綠建築標章), Eco-Quantum, *Netherlands*, Sustainable Project Assessment Routine, UK (SPeAR®), Hong Kong Building Environmental Assessment Method, Hong Kong (HK-BEAM), and Intelligent Building Index, Hong Kong (IBI).

1.6 Notions of CEPAS

CEPAS as an award-based system, is formulated to encourage improvements in building design, construction / demolition and operation processes. Participants in the scheme will be able to demonstrate their commitment publicly and to enhance their reputation and company image. The ultimate goal of implementing CEPAS in Hong Kong is to achieve a positive shift in the current performance of building sustainability in Hong Kong. Such a positive shift should be achieved by adopting the 16 major CEPAS notions through 4 directions, which are `Means to succeed', `Means to improve', `Benefits to the industry' and `Benefits to the society'. The details of the notions are described as below.

Means to improve		Means to succeed	
Raise Awareness of Public	Encourage Innovation	Flexible in Application	Acceptance by the Building Industry
Raise Awareness of Professionals	Encourage Appropriate Technology	Easy to understand indicators	Performance-based
Economic Advantages for Hong Kong	Stimulate need for Green Building	Upgradeable Assessment Framework	Modular Framework
Create positive shift	Sustainability Issues integral to Development	Applicable for Entire Building Life-cycle	Comprehensive Assessment Platforms for Industry
Benefits to Society		Benefits to Industry	

Means to succeed

The drivers that help to secure the success of CEPAS are:

Acceptance by the local building industry: CEPAS is formulated as an all-round and robust assessment method.

Flexible in applications: CEPAS framework is formulated to provide a flexible application for different users, and any type of buildings, and applicable in any stage of a building life cycle.

Easy to understand indicators: The titles of performance categories and indicators are easily understood by various building professionals. Each indicator supplemented with a detailed or technical definition or explanation to minimize potential misinterpretation and the risk of ambiguity for each indicator.

Performance - based: Performance elements are incorporated in appropriate sections of CEPAS to enhance assessment on building performance on planning, design, construction and operation stages. Strategy indictors are also included to address the major building environmental issues that are unable to be addressed in performance approach.

Means to improve

The drivers that help to improve the environment and our quality of live are:

Raise building environmental awareness of professionals: A strong awareness of comprehensive building environmental issues in CEPAS would be beneficial and are vital for planning, design, construction, management, maintenance and operation of high performing buildings. Clear messages of building environmental issues are to be conveyed to the professionals, who may ultimately bring about improved sustainable developments in Hong Kong.

Raise building environmental awareness of the public: CEPAS is to be designed and formulated to help disseminate the messages of 'consideration for the built environment' to the general public, i.e. the building users / occupants. Raising awareness of the general public inevitably changes the mindsets of the community and further improving of the local built environment through market-driven forces.

Encourage innovation: Encourage innovation in the local building industry throughout the entire building life-cycle is considered to be one of the important notions for CEPAS.

Encourage appropriate technology: CEPAS is designed and formulated in a way not to hinder but to encourage the use of appropriate and advanced technology and techniques to improve the built environment.

Benefits to the industry

The drivers can generate benefits to the industry including:

Comprehensive assessment platform for building industry: CEPAS is targeted to serve as a tool for the industry to conduct building assessments with respect to various important building environmental issues.

Applicable for entire building life-cycle: CEPAS is designed for use as an environmental assessment method for buildings by the entire building industry at any stage of a building life.

Modular framework: The modular framework of CEPAS provides flexibility to use CEPAS category modules at different building life-cycle stages and to suit different requirements of the relevant CEPAS users.

Upgradeable assessment framework: CEPAS framework is formulated to allow upgrading or modifying of the assessment framework, scoring and weighting system, incorporating or deleting indicators, as well as updating of benchmarks through the CEPAS modular framework.

Benefits to the society

The drivers can generate benefits to the society including:

Create Positive Shift to enhance long-term improvement: CEPAS aims to encourage better building environmental paradigms and to encourage improvements to existing buildings.

Sustainability issues integral to development: The notions and issues of sustainability are incorporated into the CEPAS categories and indicators such that sustainability will not be a standalone element for CEPAS, but is the core elements embedded in the assessment scheme. The three aspects of sustainable development, including society, environmental and economy sustainability are all incorporated.

Stimulate needs of green buildings: CEPAS could act as a platform to stimulate the need of green buildings in the building market and to raise the stakeholders and general public's expectations on the building environmental performance through effective implementation strategies.

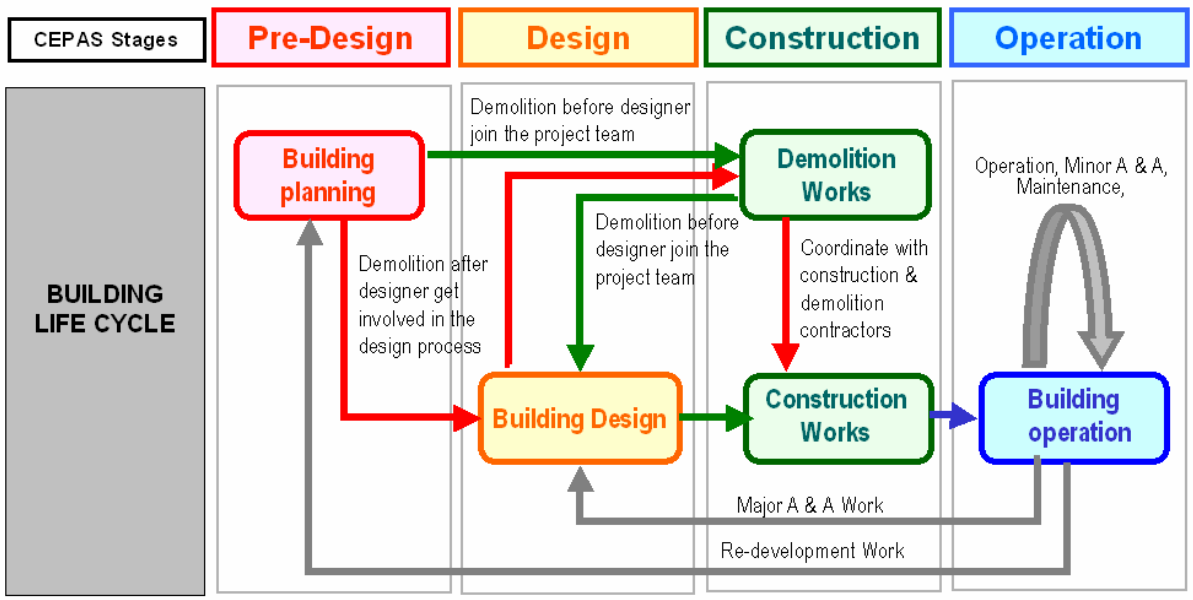
Economic advantages for Hong Kong: CEPAS could bring economic opportunities to a broader level of the entire building industry and society.

2. FRAMEWORK & CHARACTERISTICS

2.1 Building Life-Cycle

Distinct demarcation of building life-cycle stages for assessment is adopted for CEPAS. The approach provides higher flexibility such that assessment can be conducted for a specific building life-cycle stage or for all stages and engaging the appropriate stakeholders.

In CEPAS, the building life is divided into 4 stages, namely Pre-design, Design, Construction, and Operation. In assessing each particular building life-cycle period, considerations of potential impacts that may occur in later stages must be made. For example, when applying CEPAS in the design stage, other impacts, which may occur in later stages, say waste recycling due to demolition process, should also be considered. This stimulates sustainable practices for all stages and for all stakeholders. The diagram below illustrates the assessment stage demarcation of a building life cycle.



The timing of assessments is crucial as they determine the opportunities to implement changes before the design and construction have been finalized. The earlier the decision has been made, the least would be the implication to cost for incorporating the additional works or improving the proposed design works. The "stage assessment" helps to emphasize important issues at each stage, and assures that they have been achieved. For example, during pre-design stage, it is important to identify the impacts that may affect the site or the surrounding at the planning period. This helps to minimize adverse environmental impact to /from building and maximize the harnessing of natural resources, such as wind and daylight. If this is not committed in the pre-design stage, it will affect the subsequent design and operation stages and therefore, has a major impact on the ultimate outcome.

The table below describes the applications of CEPAS during different building life-cycle stages for different building works.

CEPAS Applications for different building works			
Building Stage	**Types of Building Works**		
	New Buildings	**Major Addition & Alteration Works**	**Existing Buildings (include minor addition & alteration works)**
Pre-design Stage	✓	✓	N/A
Design Stage	✓	✓	
Construction Stage (A&A, Construction)/(demolition)	✓	✓	
Operation Stage	N/A		✓

2.2 Building Types

CEPAS is designed for all types of new and existing buildings as well as building demolition and Addition & Alteration works. It is a generic assessment scheme, which acknowledges the variation of requirements at indicator level for different building types.

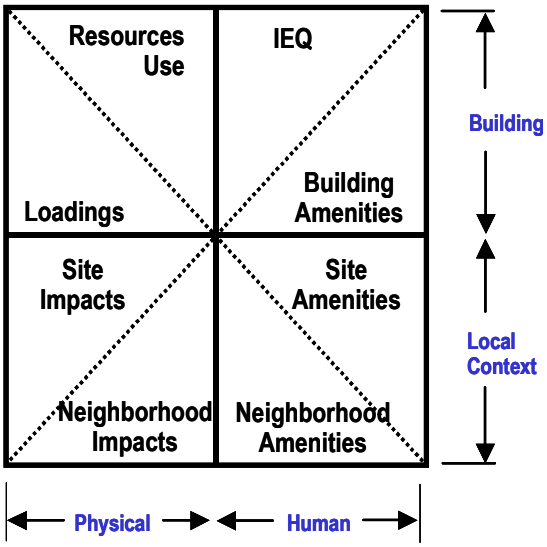
CEPAS distinguishes buildings into 2 main types, which are:

- Residential buildings
- Non-residential buildings.

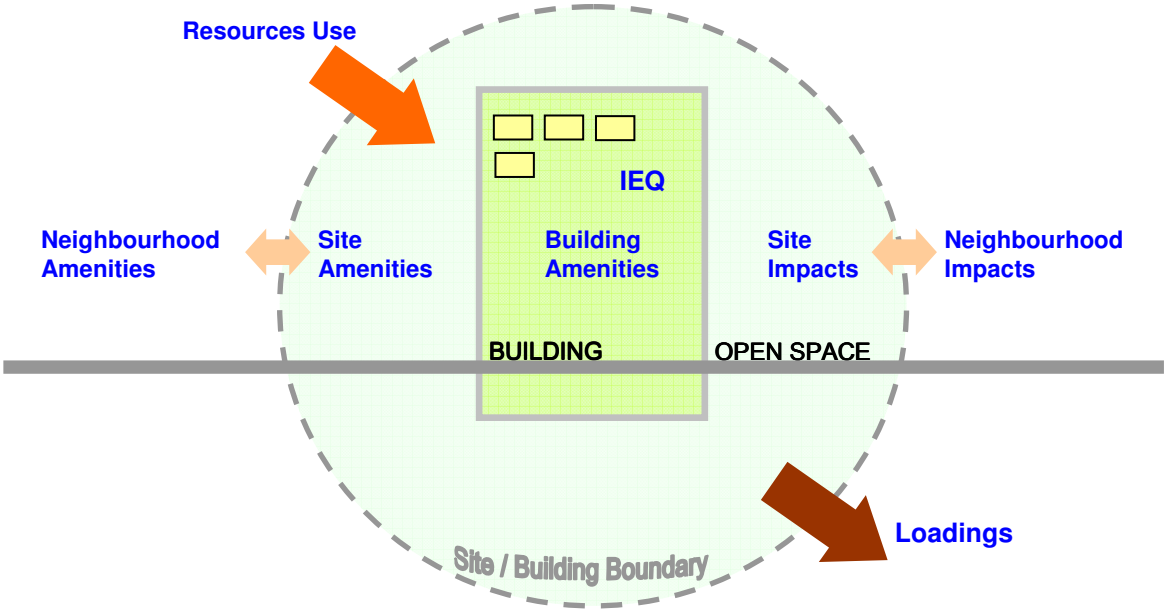
Non-residential buildings include offices, commercial, institutional buildings, mixed-used buildings, etc. For a composite building containing both residential and non-residential portions, the building performance level will be calculated proportionally according to the floor area of each portion. Please also refer to Appendix 1 for more information about the definition.

2.3 Performance Categories

The performance categories considered in CEPAS have taken into account both the international and local context. Many building environmental indicators are fragmental in context such that relevant indicators are assigned into the relevant performance categories and form an integrated CEPAS. Eight performance categories are identified for CEPAS, which are Indoor Environmental Quality (IEQ), Building Amenities, Resources Use, Loadings, Site Amenities, Neighbourhood Amenities, Site Impacts, and Neighbourhood Impacts. Also, the major sustainability considerations at building level have been incorporated. The IEQ, Building Amenities, Site Amenities and Neighbourhood Amenities are mainly human-related factors, and the remaining categories are mainly physical factors.



The inter-relationship of these categories between the site (building and open space) and neighbourhood is illustrated in the figure below. The categories and indicators covered by the CEPAS are comprehensive enough to cater for not only the environmental sustainability issues but also the social and economic sustainability issues at the level of building design, construction and operation. It measures the issues that related to the global concerns such as energy conservation, health of building users, well-being of our urban design and most of the unique urban contexts of Hong Kong.



Physical Relations of CEPAS Performance Categories

The definitions of the CEPAS performance categories are described below. Each performance category consists of numbers of performance indicators, that may be revised, added or removed from time to time to reflect the expected paradigm shift of building environmental performance and the latest building sustainability issues in Hong Kong.

Indoor Environmental Quality (IE)
This category addresses the issues relating to the *IEQ for future & existing building operation*.

Building Amenities (BA)
This category addresses the issues relating to *the management, operation, living quality & service provisions of a building.*

Resources Use (RE)
This category addresses the issues relating to the *extracted resources from the earth in & outside site boundary for building use.*

Loadings (LD)
This category addresses the issues relating to the *environmental loadings discharged from building to the environment within & outside site boundary*.

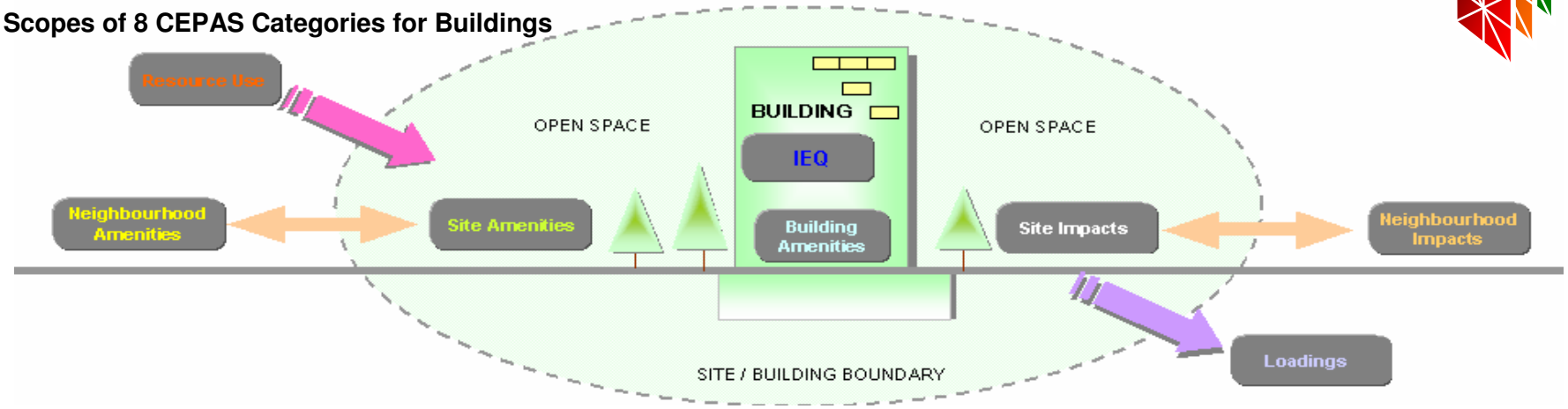
Site Amenities (SA)
This category addresses the *social and communal related issues and interactions within the site.*

Neighbourhood Amenities (NA)
This category addresses the *social and communal related issues and interactions between the site and the surroundings.*

Site Impacts (SI)
This category addresses the issues relating to the *impacts from and to the assessed buildings and its open space within site boundary*.

Neighbourhood Impacts (NI)
This category addresses the issues relating to the *impacts from and to the site and the surroundings / nearby buildings.*

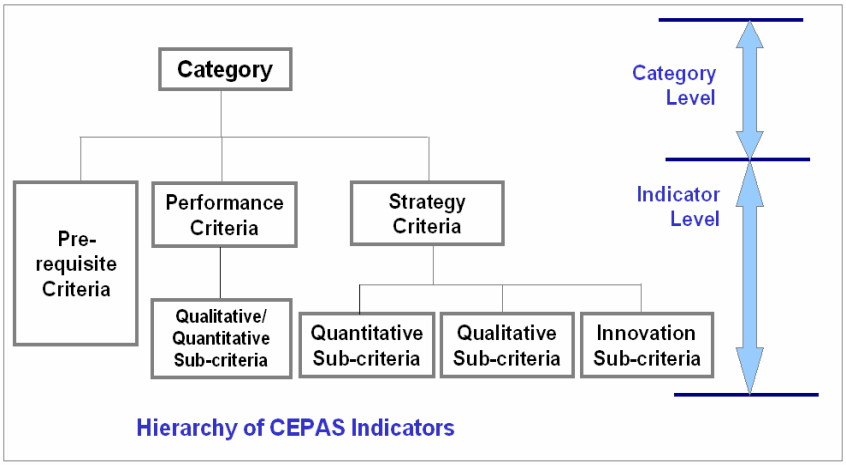
Relationships & Scopes of 8 CEPAS Categories for Buildings



	Neighbourhood Amenities	Resources Use	Site Amenities	IEQ	Building Amenities	Site Impacts	Loadings	Neighbourhood Impacts
Health & Hygiene	Environmental interaction; district-wise health & hygiene planning and provisions	No/low emitting and environmental friendly materials	Site-wise health & hygiene provisions of amenities	Low/no emitting material, visual quality & comfort, daylight, IAQ, acoustic & noise, cleansing, drainage	Health and hygiene provisions on building components and systems	Site planning for healthy environment with enhanced ventilation, daylight etc	Waste and pollution management and minimisation / mitigation	Enhanced natural ventilation, microclimate, sunlight access of neighbourhood
Resources	Conservation of heritage building; optimisation of facilities provision	Recycled/Environment friendly material use, building reuse, water recycling, water conservation, timber use	Optimised site-wide provision of amenities	Optimise resource use for good ventilation, lighting and noise provisions.	Green feature and building innovations; flexibility of building components and systems	Buildability; enhanced natural ventilation and daylight reduce system provisions	Waste management and minimisation	Enhanced natural ventilation and lighting neighbourhood for passive design
Energy	Green transport; renewable energy	Energy efficiency, renewable energy, passive building design; CO_2 and emissions reduction	Green transport; renewable energy	Thermal and visual comfort; controllability, serviceability and energy efficiency of systems.	Controllability and energy efficient of systems	Enhancement of site environment on natural ventilation & daylighting	Waste sorting & storage; CO_2 and emissions reduction	Natural ventilation and natural lighting
Materials	Conservation of heritage building; optimisation of facilities provision	Minimised material use, building reuse, material sorting & recycling	Optimisation of provision, minimisation of material use	Low/no emitting material; minimisation of material use	Low/no emitting material; minimisation of material use	Low/ no emitting material	Low/no emitting material	Reduced material use due to improved environment
Environment	Landscape; district-wide open space; minimised environmental Impacts	Waste recycling, water treatment, optimised built form & building designs	Landscape, tree preservation	Controllability, serviceability, maintainability.	Green features and building innovations; flexibility of building components and systems	Site environment, nature conservation, habitat & biodiversity	Air & Noise pollution, Waste management, Waste sorting & storage, C&D waste	Optimised solution for microclimate and heat island effect
Living Quality	Environmental nuisance; transport environmental interaction	Enhanced liveability with optimised material use	Landscape, security	Thermal comfort, visual quality and comfort, daylight & acoustic environment	Liveability; adaptability of spaces and systems	Site investigation, & planning, microclimate	Air pollution, noise pollution	Enhanced neighbourhood environmental conditions
Social	Environmental nuisance and Impacts to communities, provisions and supports to community; public participation	Optimise and reduced material use enhance competitive advantage	Inclusion, cultural character, social interaction, connectivity	Enhanced user satisfaction of good IEQ	Safety, improved quality of building and construction technology	Heritage conservation, site investigation & planning	Waste and pollution minimisation	Transport, provision for communities, minimised Impacts to communities
Management	Security of neighbourhood; public participation	Energy monitoring and audit; implementation of recycling during construction	Implementation of safety and security plan for site and building,	Implementation of IAQ management and energy efficiency plan	Safety, quality & environmental management; Controllability and serviceability of systems	Minimised site and neighbourhood impact	Waste and pollution minimisation plan	Plan for improved social assets and environmental benefits to neighbourhood
Economics	Sustainability economics	Building reuse; optimised and reduced material use; enhanced competitive advantage	Building economics; LCC	Enhanced productivity and user satisfactory of good IEQ	Optimise design and operation reduce capital and operating cost;	Reduced environmental costs	Reduced environmental costs	Environmental economics

2.4 Performance Indicators

Both the prescriptive strategic indicators and performance indicators are considered in CEPAS. Since the performance-based approach is still maturing globally, it is not possible to formulate performance indicators for all issues that are covered within a comprehensive building environmental assessment. As such, prescriptive strategy requirements are often specified as proxies in lieu of actual performance values. In view of that, it is expected that more research works will be initiated by universities, the government, professional organisations and private sectors, to further develop performance-based method for applicable CEPAS indicators in the future.



Example

Category:
IE (Indoor Environmental Quality)

Criteria:
IE 4 (Lighting Environment)

Sub-criteria:
IE 4.1 (Daylighting),
IE 4.2 (Visual Quality & Comfort)

The advantage of using prescriptive strategy requirements is that they are relatively easy to "measure" in comparison to performance indicators. Performance indicators generally require either a detailed simulation process for new designs or measured data for existing buildings. Hence, CEPAS contains both Strategy and Performance indicators.

The following tables are the summary of the number of categories, criteria and indications in different stages of the building:

Pre-Design Stage	
Number of categories	8
Number of criteria	34

Design Stage						
Number of categories	8					
Number of criteria	34					
Number of sub-criteria	48					
Total number of pre-requisites	4					
	Non-residential			**Residential**		
	Basic	**Innovation**	**Total**	**Basic**	**Innovation**	**Total**
Number of strategy indicators	128	21	149	116	21	137
Number of performance indicators	18	N/A	18	19	N/A	19
Total no. Of indicators	**146**	**21**	**167**	**135**	**21**	**156**

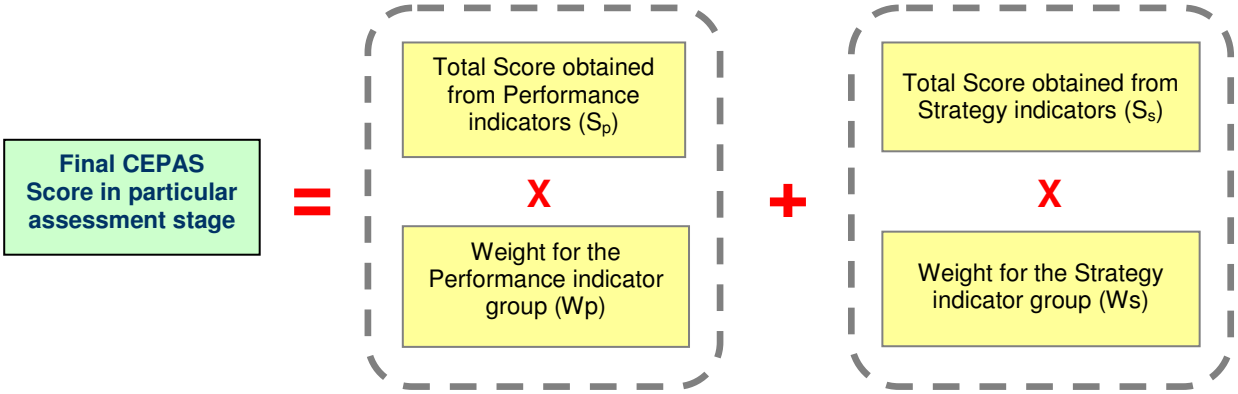
CONSTRUCTION STAGE (CONSTRUCTION WORKS)						
Number of categories	8					
Number of criteria	20					
Number of sub-criteria	23					
Total number of pre-requisites	5					
	Non-residential			**Residential**		
	Basic	**Innovation**	**Total**	**Basic**	**Innovation**	**Total**
Number of strategy indicators	69	10	79	69	10	79
Number of performance indicators	7	N/A	7	7	N/A	7
Total no. of indicators	**76**	**10**	**86**	**76**	**10**	**86**

CONSTRUCTION STAGE (DEMOLITION WORKS)						
Number of categories	8					
Number of criteria	19					
Number of sub-criteria	19					
Total number of pre-requisites	5					
	Non-residential			**Residential**		
	Basic	**Innovation**	**Total**	**Basic**	**Innovation**	**Total**
Number of strategy indicators	55	10	65	55	10	65
Number of performance indicators	4	N/A	4	4	N/A	4
Total no. of indicators	**59**	**10**	**69**	**59**	**10**	**69**

OPERATION STAGE						
Number of categories	8					
Number of criteria	25					
Number of sub-criteria	40					
Total number of pre-requisites	4					
	Non-residential			**Residential**		
	Basic	**Innovation**	**Total**	**Basic**	**Innovation**	**Total**
Number of strategy indicators	109	17	126	97	17	114
Number of performance indicators	12	N/A	12	13	N/A	13
Total no. of indicators	**121**	**17**	**138**	**110**	**17**	**127**

2.5 Weighting

Weighting system for an assessment method enables prioritisation and serves as a graded scale of performance. The final score obtained in each assessment stage is the sum of the total score obtained in the groups of performance indicators and strategy indicators. For sub-criteria in Design Stage, more stringent requirement is set for indoor air quality and the score "0" is replaced by "Fail". If `Fail' is obtained in the Sub-criteria, the entire CEPAS assessment is considered as fail.



In CEPAS, each category is allocated with a specific weighting, which directly influences the cumulative performance scores. These weighting factors are developed from a consultation forum, held in July 2003, which solicit the opinions from local building professionals and building user groups/ green groups on their view towards the relative importance of the building performance issues. The weighting of the 8 categories are presented as follows:

Categories	Weightings
Indoor Environmental Quality (IE)	0.960
Building Amenities (BA)	0.875
Resources Use (RE)	1.000
Loadings (LD)	0.850
Site Amenities (SA)	0.810
Neighbourhood Amenities (NA)	0.820
Site Impacts (SI)	0.810
Neighbourhood Impacts (NI)	0.850

2.6 Scoring

The score obtained in each CEPAS stage can be calculated by the following formula:

Calculation of CEPAS Total Score in each building stage

CEPAS Total Score = CEPAS Total (Performance) Score (S_p) X Performance Weighting (W_p) + CEPAS Total (Strategy) Score (S_s) X Strategy Weighting (W_s)

Calculation of CEPAS Total (Performance/Strategy) Score in each building stage

CEPAS Total (Performance/Strategy) Score (S_p/S_s) = $W_{IE}\ S_{IE} + W_{BA}\ S_{BA} + W_{RE}\ S_{RE} + W_{LD}\ S_{LD} + W_{SA}\ S_{SA} + W_{SI}\ S_{SI} + W_{SI}\ S_{SI} + W_{NI}\ S_{NI}$

Calculation of Category (Performance/Strategy) score

Category (Performance/Strategy) Score (S) = $\Sigma\ W_c\ S_c$

e.g. $S_{IE} = W_{c(IE\ 1)}\ S_{c(IE1)} + W_{c(IE\ 2)}\ S_{c(IE2)} + W_{c(IE\ 3)}\ S_{c(IE3)} + W_{c(IE\ 4)}\ S_{c(IE4)}$

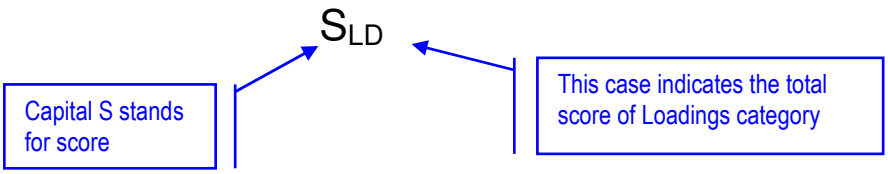
Calculation of Criteria (Performance/Strategy) score

Criteria Score (S_c) = $\Sigma\ S_{s\ c}$

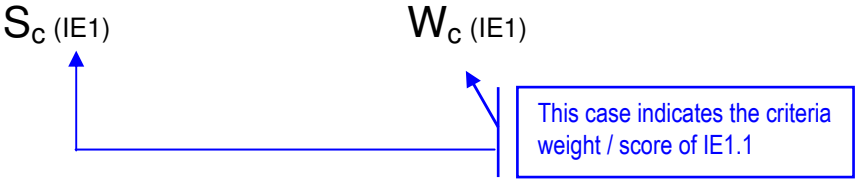
Notation:

S_c - Criteria Score
W_c - Criteria Weight
S_{sc} – Sub-criteria Score

Example:
For Category Score:



For Criteria Score and Weight:



Scoring for Other Special Items

Innovation Items

Innovation items can be found in many appropriate sub-criteria. The purpose of establishing these items is to encourage various stakeholders including building developers, owners, designers, contractors, planners, operators, and building environmental specialists to come up with more creative and practical discovery to the industry.

In general, greater flexibility will be granted to building attempting such items. The submittal for these items also open to the applicants. However, it is necessary to provide sufficient evidences to prove that the specified intent of the indicator is fulfilled.

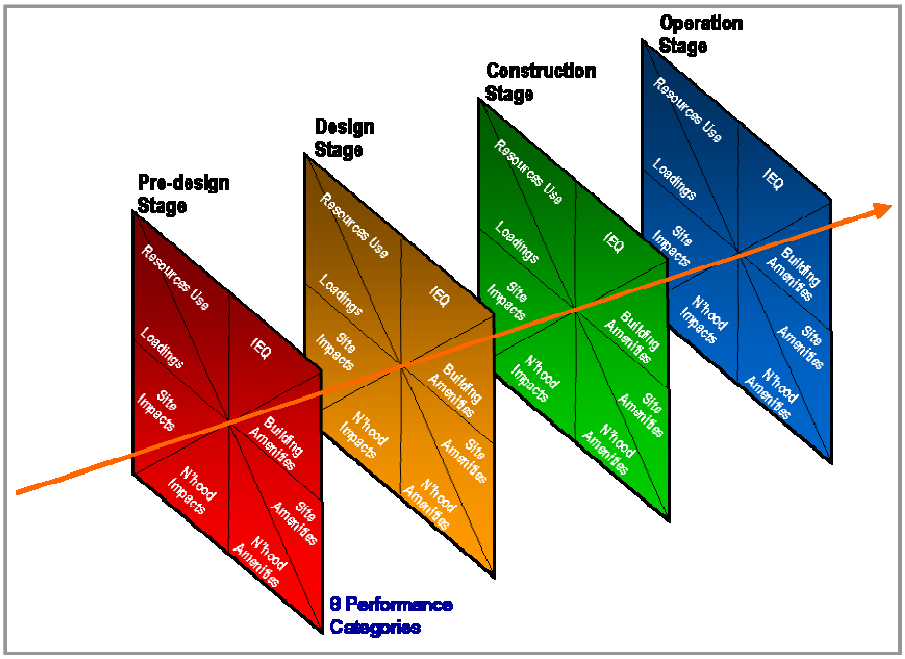
As Innovative items in many sub-criteria usually requires a considerably amount of additional investment to implement, their credit are counted independently from other general indicators. In other words, the “1 credit” attained from innovation item will directly subject to the total score of each sub-criteria level instead of gauging among the sub-criteria performance scale.

Items with heavier weight in the sub-criteria

Particular items like “designated centralised space and facilities provided for sorting and storage of recyclable and non-recyclable waste” under LD 2.2 are considered as more essential items relative to other indicators inside the same sub-criteria, such that double counting are granted.

2.7 CEPAS Characteristics

Apart from using the CEPAS as a performance assessment scheme, it can also be adopted as a decision-making tool for developers, designers, builders, owners, users and stakeholders. The defining characteristics of CEPAS include the considerations of sustainability, building life-cycle, modular assessment structures, neighbourhood context and life-cycle analysis for building components. Several key features for the CEPAS framework are summarized as follow:



2.7.1 *Generic Assessment Scheme*

CEPAS is a generic assessment scheme, which acknowledges the variations of requirements for different building types. The framework is designed to suit new and existing buildings. A single version that addresses a set of performance issues common to all buildings but with small variation or sub-divisions to account for specific difference, can significantly simplify the process. Areas of specifications for different buildings based on their usages have been addressed in CEPAS at indicator level.

2.7.2 *Life-cycle Consideration*

CEPAS framework aims to provide a building environmental performance assessment in relation to the major building life-cycle stages. Labelling and certification of performance is possible at specific stages, instead of a single label or award designated for the entire building life-cycle period.

2.7.3 *Neighbourhood Consideration*

CEPAS assesses the building environmental issues that extend to the neighbourhood of the site. `Quality of Life' issues that interfaces with the public realm are promoted. CEPAS requires performing analysis on site constraints and the assessed building acknowledging benefits to the unique local neighbourhood context.

2.7.4 *Modular Framework*

The highly flexible modular system of CEPAS is another major advancement when compared with many existing building environmental assessment schemes. The modular system allows flexibility for users to carry out assessments either through CEPAS assessor or by self-assessment. The eight categories have encompassed all relevant issues of both local and global concerns and captured the local unique high-

density and high-rise urban context. Under each category, long list of assessment indicators, which in terms of criteria and sub-criteria were developed based on their importance and practicality as identified in the extensive researches conducted, questionnaire survey, discussion forum and expert advices. Grouping of several assessment modules category are possible to allow flexibility for assessment and certification in the future CEPAS development.

2.7.5 Interface with Other Schemes

The development of CEPAS indicators has incorporated virtues of existing schemes including international and government initiatives, such as the EPD Indoor Air Quality Certification Scheme for Offices and Public Places, EMSD Building Energy Codes, and local private initiates such as HK-BEAM etc. It is expected that mutual supports and shared efforts from local academia and other local & international schemes and initiatives for further research and development of CEPAS, will be beneficial to create a positive shift of building environmental performance in Hong Kong.

3. TARGET USERS

CEPAS is formulated with sufficient comprehensiveness to suit the requirements and concerns of various parties related to building. Different target groups focus on particular types of building works and building stages. Major CEPAS target users at different building stage and work combinations, are described in the table below as for reference.

Intended Users for CEPAS in different building works			
Building Stage	**Types of Building Works**		
	New Buildings	**Major Addition & Alteration Works**	**Existing Buildings (include minor addition & alteration works)**
Pre-design Stage	• Developers • Planners • Building environmental specialists	• Building owners / Developers • Building operators • Designers • Building environmental specialists	Used as reference and design review in Operation Stage. No assessment in Pre-design, Design and Construction Stages.
Design Stage	• Developers / Project managers • Designers / Contractors (design & build) • Building environmental specialists	• Building owners / Developers / Project managers • Building operators • Designers / Contractors (design & build) • Building environmental specialists	
Construction Stage (A&A, Construction / demolition)	• Contractors • Developers / Project managers • Designers • Building environmental specialists	• Contractors • Building owners / Developers / Project managers • Designers • Building environmental specialist • Building operators	
Operation Stage	Used as reference for other building stages. No assessment in Operation Stage.		• Building owners • Building operators / property manager • Owners' Corporation • Building environmental specialists • Designers (design review)

4. CEPAS ASSESSMENT & LABEL

4.1 CEPAS Assessment

Pre-Design Stage

Objectives of Assessment

This is the first stage of CEPAS assessment. At this stage, the building design has not come into existence. A detailed assessment may not be necessary. Instead, the objectives for *Pre-Design Stage* assessment are:

- To address sustainability principles at the conceptual stage of the project
- To identify the potential environmental constraints and opportunities of the project
- To incorporate appropriate building environmental concerns into the developers' Design Brief / Project Brief

In the *Pre-Design Stage*, the developers/owners need to determine the financial and technical feasibility of the development, and how sustainable principles can be implemented in the development while considering the site-specific constraints and opportunities. Assessment for this stage focuses on the commitments.

Where appropriate, the applicable building environmental considerations should be included in the scope of work to demonstrate the commitment. The project budget and schedule should include an allowance for sustainable design and construction. The next step is to educate the project team and set design goals explicitly. At the time when planners and designers are employed, strategies should be identified and targets should be set as the design progress.

Requirements

1. Completed CEPAS Building Data Sheet for Pre-design Stage (for developer's / building owner's record)
2. Completed CEPAS Pre-Design Stage Assessment Form (for developer's / building owner's record)
3. Site Appraisal Report and environmental policy report for Pre-Design Stage

The building developer / planner / owner / building environmental specialist is required to include all performance requirements in the project brief as described in the Pre-Design Stage assessment scheme and to make firm commitments. The committed indicators should be kept as a record and incorporate the performance notions in the design brief / project control document. Also, a site appraisal report and environmental policy report shall be produced in the Pre-design Stage.

If a building developer / planner / owner / building environmental specialist is intending to join the award assessment in the subsequent building stages, verification of the Pre-design Stage commitments and supporting documents shall be carried out in the Design Stage submission. The site appraisal report should include but not be limited to preliminary evaluation on environmental issues such as ventilation, daylight, noise, air quality, transportation, etc. The environmental policy should declare objectives for the project.

The earlier the project team recognize the environmental issues, the better will be the outcome. The need for documentation is to encourage the developer / design team address the environmental issues at the very beginning, before the detailed designs or provisions become fixed. Also, it is believed that the developer should consider, based on their available resources, site constraints, opportunities and other factors in setting the targets. If their targets or commitments are not being recorded in the form of design brief or environmental policy, the design team may not have the capacity or allow room to change; even if they are committed to that. For the documentation requirements, such as site appraisal report, which is

considered as the basic requirement to kick-off a sustainable building project, but no award would be given for conducting such an exercise.

Guidelines for Site Appraisal Report Preparation

This report is intended to demonstrate that the developer / owner / planner has made a preliminary site assessment of various environmental aspects. The appraisal report shall be concise in content and comprehensively considered rather than long-winded, clearly presented rather than detailed graphically attractive, and logically concluded rather than grandly projected. The basic content of an acceptable appraisal report should include a brief survey of various performance indicators as described in the Pre-Design Stage assessment scheme, such as the baseline environmental survey in and around the project site, background noise level, wind direction, air quality, micro-climate, local vegetation, daylight, natural resources as well as background community information.

The format of the report depends on the size, scale and complexity of the site. The appraisal report may vary from a simple booklet listing the findings and citation on each aspect for a project, to the compilation of a thorough study report enclosing the relevant specialist consultants' input. In any case the depth of the appraisal should be appropriate to the complexity of the issues involved and the likely level of environmental challenge or impact of the project. Marked up site plans, simplified charts or diagrams may often be more effective than long descriptions. Photographical records should be limited to essential visual presentation of inter-relationship of existing features or views. If possible, some preliminary computer simulation carried out by consultants could also be included in the appraisal.

Design Stage

Objectives of Assessment

In the Design Stage, design strategies will be developed according to the items specified in the project brief, and then followed by detailed design. The objectives for the *Design Stage* assessment are:

- To encourage designers to incorporate sustainable elements into building design.
- To provide an initial guidance for designers to develop a site-specific sustainable building design.
- To conduct detailed assessment of the design to meet the performance standard for labelling purpose.
- To minimize the impact of the building development on existing natural features within the site and incorporate them into the building design.In the *Design Stage*, project managers / developers may employ relevant designers and building environmental specialists to carry out design schemes. Contractors may be involved in the Design Stage assessment if Design and Build method is adopted. Therefore, one of the objectives of the assessment at this stage is to assess the effort of the whole design team.

Design strategies are to be refined through the whole process of design stage and the scoring form and project history should be updated periodically to reflect the situation. The strategies and requirements should be identified and included in the construction documents and specifications, and be incorporated in the whole design development.

Requirements

For Design Stage assessment, the following information shall be submitted for review:

1. Completed CEPAS Building Data Sheet for Design Stage
2. Completed CEPAS Design Stage assessment form
3. The required supporting documents as described in the assessment scheme
4. Completed CEPAS Pre-Design Stage assessment form (No assessment on Pre-Design Stage to be made by CEPAS administrator, but required for record)

5. Site Appraisal Report and environment policy report for Pre-Design Stage (No assessment to be made by CEPAS administrator, but required for record)
6. Verification of the commitments made in the Pre-Design Stage Assessment have been incorporated in the Design Stage document.

Construction Stage

Objectives of Assessment

At construction stage, all major designs are normally completed. The focus should be placed on the environmental performance in building construction, demolition, addition and alteration process. Therefore, the objectives of the *Construction Stage* assessment are:

- To assess the contractors' performance on various environmental issues during construction, demolition, addition & alteration process
- To provide an initial guidance for contractor to develop a sustainable and site-specific performed construction, demolition, addition & demolition process
- To conduct detailed assessment of environmental concerned strategies and measures as well as the effectiveness in implementation

In the *Construction Stage*, developers / project managers / designers / building environmental specialists will monitor the construction, demolition, addition & alteration works carried out. Contractors shall carry out the works according to design intentions and then hand-over to building owners, operators or facility managers. This stage assesses the effort of contractors and project manager in the way they performed during the work process.

In the tender process, a contractor with a good track record of implementing sustainable construction works may be more favored by the developers / project managers. Pre-qualification of contractors with sustainable building construction experience could be one means of recognizing this.

Requirements

For Construction Stage assessment, the following information shall be submitted for review:

1. Completed CEPAS Building Data Sheet for Construction Stage (construction and/or demolition works)
2. Completed CEPAS Construction Stage (construction and/or demolition works) assessment form
3. The required supporting documents as described in the assessment scheme
4. Completed Design Stage assessment form and assessment results (if applicable)

Operation Stage

Objectives of Assessment

The Operation Stage assesses the environmental performance of building operation, including minor A&A works within the site boundary. This is the longest stage in the building life cycle. The objectives of the *Operation Stage* assessment are:

- To assess the actual environmental performance in an existing building
- To provide an initial guidance for building operators / owners to further develop site-specific building management & operation strategies
- To encourage the involvement of building owners, property managers, building users and Owners' Corporation in the monitoring and improvement process of the building environmental conditions

The *Operation Stage* comprises of building operation, management, and maintenance works. This stage assesses the existing built environmental performance of the operators and the building users on how to

maintain and operate the building, as well as the environmental quality of the building. If the existing building user would like to retrospectively evaluate the existing provisions of the building in relative to a newly designed building with good building environmental performance, the Design Stage assessment checklist could be referred to. Developers and designers may also carry out a design review to improve the design objectives for future building projects.

Requirements

For Operation Stage assessment, the following information shall be submitted for review:

1. Completed CEPAS Building Data Sheet for Operation Stage
2. Completed CEPAS Operation Stage assessment form
3. The required supporting documents as described in the assessment scheme
4. Completed Design Stage and Construction Stage assessment forms and assessment results (if applicable)

4.2 CEPAS Label

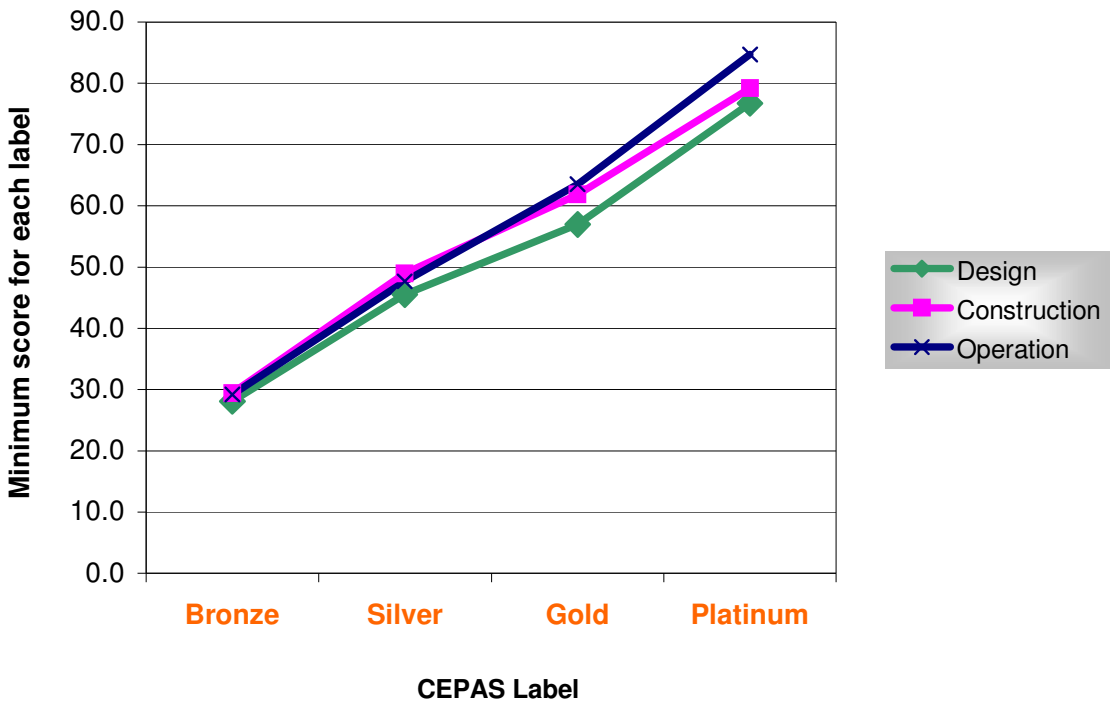
A CEPAS performance label will be issued by the CEPAS administrator at the end of Design / Construction / Operation stage after a completed building environmental performance assessment process for the relevant stage. The label issued for Design and Construction Stages are valid permanently, but the label issued for Operation Stage is valid for 5 years only and re-assessment is expected well before label expiry. The CEPAS performance labels are divided into 4 levels, which are `Platinum', `Gold', `Silver' and `Bronze'.

Buildings obtaining a `Gold' label would be an exemplar of very good building environmental performance, according to current building standards and local conditions of the local building industry. Buildings obtaining a `Platinum' label would be able to establish a new standard to create a positive paradigm shift to the building industry in the forthcoming years. Further improvements of the overall building environmental performance level relative to the current standard is expected.

Achieving the `Bronze' label will be relatively easy by means of compliance of current environmental-concerned standards as stipulated by BD, EMSD, EPD, etc. Conversely, the difficulty in acquiring a high grade certification, e.g. `Platinum' label, should not be too relaxed in order to encourage a genuine improvement of the environmental performance of buildings and to encourage innovation. A building obtaining any performance label represents its satisfaction to basic environmental performance requirements.

Performance Grading with respect to the Interpretation and Level of Achievements	
CEPAS Performance Label	**Interpretation and level of achievements**
Platinum	▪ Establish a new standard to create a positive paradigm shift to the building industry in the forthcoming years ▪ For building with outstanding performance ▪ Encourage research works on innovation ▪ Buildings adopted many genuine innovative and additional building environmental performance
Gold	▪ Equivalent to very high building environmental performance standard according to current building standards and local conditions
Silver	▪ Equivalent to good building environmental performance standard according to current building standards and local conditions
Bronze	▪ Equivalent to above average building environmental performance standard of existing buildings ▪ Compliance of current environmental-concerned standards

The graph below shows the relative building environmental performance levels for different performance labels. It is expected that it would be very challenging to obtain the Platinum level, while a Bronze label is also recognized as above average environmentally performance.



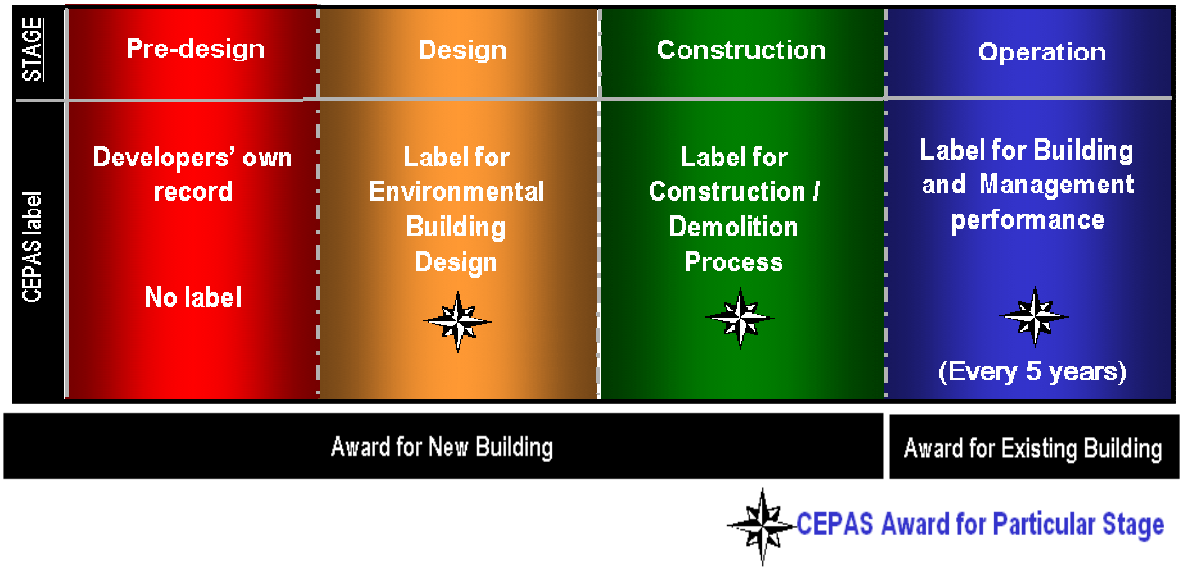
The following table shows the minimum scores required to achieve each label in CEPAS:

Grade	CEPAS Design Stage	CEPAS Construction Stage (Construction Works)	CEPAS Construction Stage (Demolition Works)	CEPAS Operation Stage
Minimum score required to achieve each grade (based on 100 full marks)				
Bronze	28	29	29	29
Silver	45	50	50	48
Gold	57	62	67	64
Platinum	77	79	78	85

4.3 CEPAS Performance Results

Certification of the environmental performance of a building in CEPAS is credited in the Design, Construction and Operation stages. Pre-Design Stage is formulated for self-assessment purpose such that labelling is not available.

4.3.1 Performance Label



4.3.2 Presentation of Performance Results

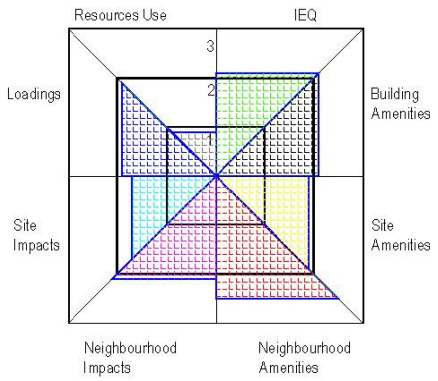
Apart from the overall performance level in the CEPAS assessment, detailed building environmental performance for each category and criteria can be presented in both a tabular and graphical form. All performance result presentation methods help for the building development process in each stage. The scale of improvements in the self-assessment draft and final assessment can be determined.

a) Summarised Result Table

The CEPAS scoring and weighting tables for various stages are shown in individual assessment manual.

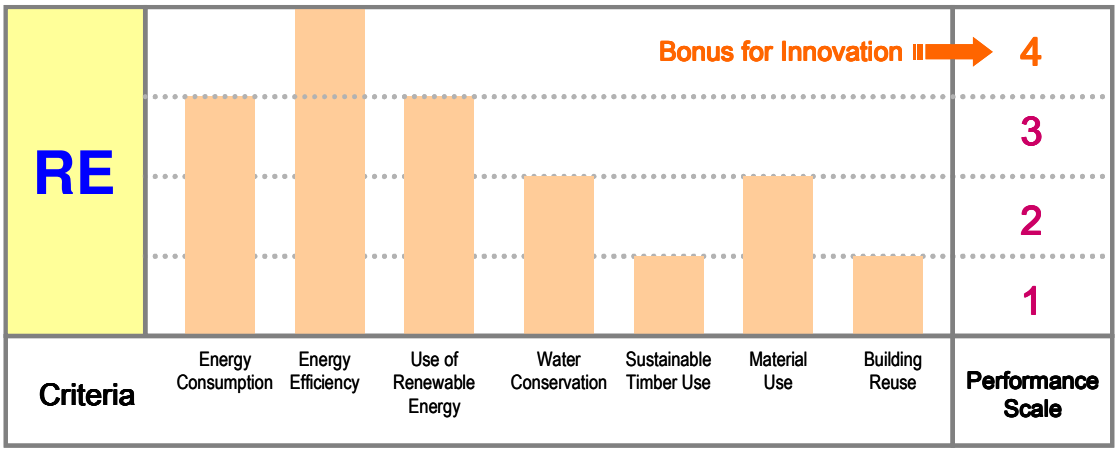
b) CEPAS Category Performance Results

The performance level obtained in each CEPAS Category is calculated by the sum of performance score obtained from all Criteria under the same Category. The relative performance for the 8 categories can be presented in a graphical form. The chart below shows a possible example of performance category results.



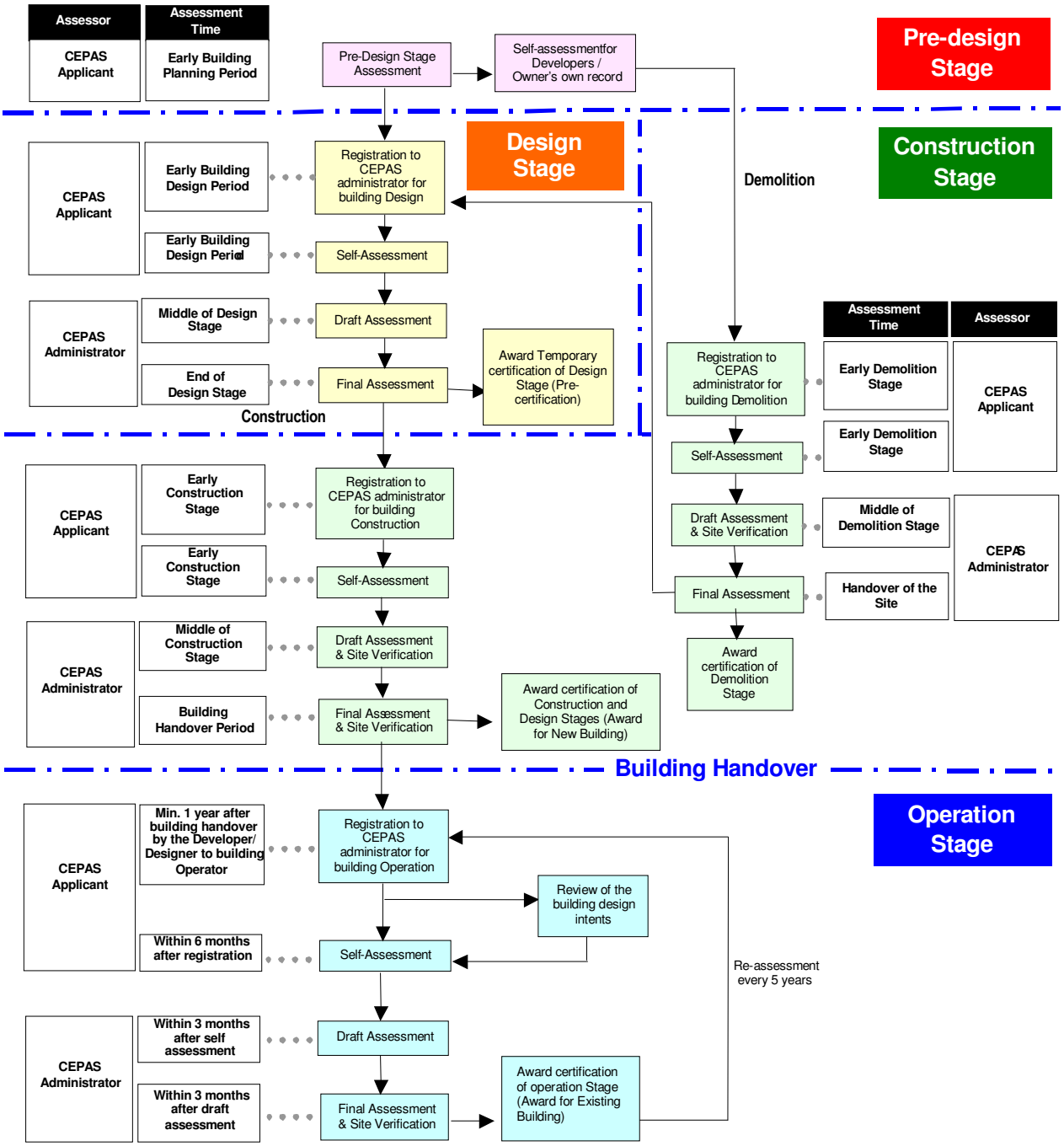
c) CEPAS Criteria Performance Results

The performance level obtained in each CEPAS Criteria is calculated by the sum of performance score obtained from all performance indicators under the same Criteria. The relative performance for each Criterion can be presented in a graphical form. The chart below shows a possible example of performance criteria results for Resources Use category.



5. CEPAS ASSESSMENT AND CERTIFICATION PROCESS

For a building awarded with a performance label in the CEPAS, it is entitled to use `**CEPAS Certified New/Existing Building'** in marketing and other publications publicity. A certificate with corresponding performance label will also be issued by the CEPAS administrator for the certified building. The CEPAS applicant shall be the client's representative, who can be any "Intended User" as described in the Section 3.



APPENDIX 1. LIST OF DEFINITIONS

In this assessment scheme, unless otherwise stated, words and expressions have the meaning attributed to them by the Building Ordinance and other relevant Ordinances and Regulations of the HKSAR Government. It should also be noted that:

Building	:	Superstructure, basement structure and open space within the project site boundary
Composite building	:	A building development containing both residential and non-residential portions
Core & shell area	:	The area within the building under direct control of the developer and building operator
Floor area	:	Gross Floor Area as defined in the Building Ordinance
Non-residential building	:	Non-domestic building as defined in the Building Ordinance, and buildings serving for hotel and serviced apartment purposes
Non-residential buildings (other than Offices & Public Places)	:	Include, but not limited to the usages of industrial building, such as building for manufacturing and go down; medical building, such as clinic, infirmary & hospital.
Residential building	:	Domestic building as defined in the Building Ordinance, but exclude buildings serving for hotel and serviced apartment purposes <u>Note:</u> 1. If the development / premise is designed as a housing estate only, the club house, supermarket and small retail inside the residential development / premise shall be assessed in the residential building portion. If a shopping mall or office floor is attached to a single residential building / housing estate, the development shall also be assessed as a composite building. 2. If a shared facility (e.g. carpark, public transport interchange) is provided in a composite building, score will be eligible to award for both residential and non-residential portions.
Open Space	:	Uncovered area on street level or podium

APPENDIX 2. LIST OF ABBREVIATIONS

The following abbreviations shall be referred in this assessment scheme:

A&A	Addition and Alternation
ACH	Air Change per Hour
AFCD	Agriculture, Fisher and Conservation Department, HKSAR Government
AP	Authorized Person
ArchSD	Architectural Service Department, HKSAR Government
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers, USA
BA	Building Authority, HKSAR Government
BD	Buildings Department, HKSAR Government
BRE	Building Research Establishment, UK
BREEAM	Building Research Establishment Environmental Assessment Method, UK
BS	British Standard
BSRIA	Building Services Research and Information Association, UK
C&D	Construction and Demolition
CASBEE	Comprehensive Assessment System of Building Environmental Efficiency for Japan
CCMS	Central Control and Monitoring System
CEDD	Civil Engineering and Development Department, HKSAR Government
CEPAS	Comprehensive Environmental Performance Assessment Scheme
CIBSE	Chartered Institution of Building Services Engineers, UK
CIE	Commission Internationale de Eclairage
CIRIA	Construction Industry Research and Information Association, UK
COP	Code of Practice
DSD	Drainage Services Department, HKSAR Government
EIA	Environmental Impact Assessment
EMGB-Taiwan	Evaluation Manual for Green Buildings in Taiwan 綠建築標章
EMO	Energy Management Opportunity
EMSD	Electrical and Mechanical Services Department, HKSAR Government
EPD	Environmental Protection Department, HKSAR Government
ETWB	Environmental, Transport and Works Bureau, HKSAR Government
EUI	Energy Utilisation Index
FEHD	Food and Environmental Hygiene Department
FSD	Fire Services Department, HKSAR Government
GBC	Green Building Challenge
GBTool	Green Building Tool
GFA	Gross Floor Area
GHEM - PRC	Green House Evaluation Manual – China Assessment Handbook for Ecological Residential Building 中國生態住宅技術評估手冊
HK-BEAM	Hong Kong Building Environmental Assessment Method
HKHA	Hong Kong Housing Authority, HKSAR Government
HKHD	Hong Kong Housing Department, HKSAR Government
HKIA	The Hong Kong Institute of Architects
HKIE	The Hong Kong Institution of Engineers
HKIP	Hong Kong Institute of Planners

HKIS	The Hong Kong Institute of Surveyors
HKPolyU	The Hong Kong Polytechnic University
HKSAR	Hong Kong Special Administrative Region of the People's Republic of China
HVAC	Heating, Ventilation and Air-Conditioning
HVACR	Heating, Ventilation, Air-Conditioning and Refrigeration
HVCA	Heating and Ventilating Contractors Association, UK
IAQ	Indoor Air Quality
IBI	Intelligent Building Index, Hong Kong
IEQ	Indoor Environmental Quality
IESNA	Illumination Engineering Society of North America
ISO	International Organization for Standardization
LA	Land Authority, HKSAR Government
LandsD	Lands Department, HKSAR Government
LEED	Leadership in Energy and Environmental Design, USA
LCA	Life Cycle Analysis
LCC	Life Cycle Costing
NABERS	The National Australian Building Environmental Rating System of Australia
N/A	Not Applicable
O&M	Operation and Maintenance
ODS	Ozone-depleting substances
OTTV	Overall Thermal Transfer Value
PlanD	Planning Department, HKSAR Government
PGBC	Professional Green Building Council, Hong Kong
PNAP	Practice Notes for Authorised Persons and Registered Structural Engineers, issued by BD, HKSAR Government
PNRC	Practice Notes for Registered Contractors, issued by BD, HKSAR Government
ProPECC PN	Professional Persons Environmental Consultative Committee Practice Notes, issued by EPD, HKSAR Government
SC	Site Coverage
SDU	Sustainable Development Unit, HKSAR Government
SPeAR®	Sustainable Project Appraisal Routine
SUSDEV21	Sustainable Development for the 21st Century, HKSAR Government
WSD	Water Supplies Department, HKSAR Government

APPENDIX 3. LIST OF RELATED LEGISLATIONS, CODES OF PRACTICE & DESIGN MANUALS BY THE HKSAR GOVERNMANT

Major Legislations, Codes of Practice, Design manuals published by the HKSAR Government, but not exhaustive, are described in this sections for reference.

Laws of Hong Kong

Chapter

123 Buildings Ordinance

- Building (Administration) Regulations
- Building (Construction) Regulations
- Building (Demolition Works) Regulations
- Building (Planning) Regulations
- Building (Private Streets and Access Roads) Regulations
- Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations
- Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations
- Building (Ventilating Systems) Regulations
- Building (Oil Storage Installations) Regulations
- Building (Energy Efficiency) Regulation
- Building (Appeal) Regulation

7 Landlord and Tenant (Consolidation) Ordinance

17 Lands Tribunal Ordinance

28 Land (Miscellaneous Provisions) Ordinance

40 Government Leases Ordinance

51 Gas Safety Ordinance

53 Antiquities and Monuments Ordinance

59 Factories and Industrial Undertakings Ordinance

95 Fire Services Ordinance

102 Waterworks Ordinance

121 Buildings Ordinance (Application to the New Territories) Ordinance

124 Lands Resumption Ordinance

126 Government Rights (Re-entry and Vesting Remedies) Ordinance

128 Land Registration Ordinance

130 Land Acquisition (Possessory Title) Ordinance

131 Town Planning Ordinance

132 Public Health and Municipal Services Ordinance

152 New Territories (Renewable Government Leases) Ordinance

172 Places of Public Entertainment Ordinance

201 Prevention of Bribery Ordinance
208 Country Parks Ordinance
211 Aerial Ropeways (Safety) Ordinance
243 Child Care Services Ordinance
279 Education Ordinance
295 Dangerous Goods Ordinance
301 Hong Kong Airport (Control of Obstructions) Ordinance
311 Air Pollution Control Ordinance
317 Industrial Training (Construction Industry) Ordinance
327 Lifts and Escalators (Safety) Ordinance
337 Demolished Buildings (Re-development of Sites) Ordinance
344 Building Management Ordinance
349 Hotel and Guesthouse Accommodation Ordinance
354 Waste Disposal Ordinance
358 Water Pollution Control Ordinance
360 Pneumoconiosis (Compensation) Ordinance
370 Roads (Works, Use and Compensation) Ordinance
374 Road Traffic Ordinance
376 Clubs (Safety of Premises) Ordinance
400 Noise Control Ordinance
406 Electricity Ordinance
408 Architects Registration Ordinance
409 Engineers Registration Ordinance
417 Surveyors Registration Ordinance
438 Sewage Tunnels (Statutory Easements) Ordinance
447 Bedspace Apartments Ordinance
459 Residential Care Homes (Elderly Persons) Ordinance
470 Builders' Lifts and Tower Working Platforms (Safety) Ordinance
487 Disability Discrimination Ordinance
502 Fire Safety (Commercial Premises) Ordinance

Codes of Practice

- Code of Practice on Avoiding Danger from Gas Pipes
- Code of Practice on Building Works for Lifts and Escalators
- Code of Practice for Energy Efficiency of Air Conditioning Installations
- Code of Practice for Energy Efficiency of Electrical Installations

- Code of Practice for Energy Efficiency of Lighting Installations
- Code of Practice for Energy Efficiency of Lift & Escalator Installations
- Code of Practice for Fire Resisting Construction
- Code of Practice for Hong Kong LPG Industry
- Code of Practice on Inspection & Maintenance of Water Carrying Services Affecting Slopes
- Code of Practice on Installation of Electrically Operated Sliding Gates, Sliding Glass Doors and Rolling Shutters
- Code of Practice for Minimum Fire Service Installations and Equipment & Inspection, Testing and Maintenance of Installations and Equipment
- Code of Practice for Means of Access for Firefighting and Rescue
- Code of Practice on Oil Storage Installations
- Code of Practice for Overall Thermal Transfer Value in Buildings
- Code of Practice on Private Roads
- Code of Practice for the Provision of Means of Escape in Case of Fire
- Code of Practice for Site Safety Supervision
- Code of Practice on the Design and Construction of Builders' Lifts
- Code of Practice on the Design and Construction of Lifts and Escalators
- Code of Practice on The Handling, Transport and Disposal of Asbestos Wastes
- Code of Practice on The Loading of Vehicles
- Code of Practice for Structural Use of Concrete
- Code of Practice for Structural Use of Steel
- Code of Practice on Wind Effects
- Code of Practice for Demolition of Buildings (2004)
- Code of Practice for Prevention of Legionnaires' Disease 2000
- Code of Practice: Safety and Health at Work for Gas Welding and Flame Cutting
- Code of Practice: Safety and Health at Work for Manual Electric Arc Welding
- Code of Practice: Safety and Health at Work for Industrial Diving
- Code of Practice: Safety and Health at Work with Asbestos
- Code of Practice for Bamboo Scaffolding Safety
- Code of Practice for Safe Use and Operation of Suspended Working Platforms
- Code of Practice for Safety and Health at Work (Land-based Construction over water -- Prevention of Fall)
- Code of Practice for Safety and Health at Work in Confined Spaces
- Code of Practice for Safety at Work (Lift and Escalator)
- Code of Practice for Metal Scaffolding Safety
- Code of Practice for Safe Use of Tower Cranes
- Code of Practice for Safe Use of Mobile Cranes
- Code of Practice on Safety Management

- Performance-based Building Energy Code
- Code of Practice for Precast Concrete Construction 2003

Design Manuals

- Guide to Fire Safety Design for Caverns
- Structures Design Manual for Highways and Railways
- Construction Standard CS1:1990:Testing Concrete
- Construction Standard CS2 : Carbon Steel Bars for the Reinforcement of Concrete
- Design Manual - Barrier Free Access
- General Specification for Civil Engineering Works
- GEOGUIDE 1 : Guide to Retaining Wall Design
- GEOGUIDE 2 : Guide to Site Investigation
- GEOGUIDE 3 : Guide to Rock and Soil Descriptions
- GEOGUIDE 4 : Guide to Cavern Engineering
- GEOGUIDE 5 : Guide to Slope Maintenance
- GEOSPEC 1 : Model Specification for Prestressed Ground Anchors
- GEOSPEC 2 : Model Specification for Reinforced Fill Structures
- Geotechnical Manual for Slopes
- Highway Slope Manual
- Technical Guidelines on Landscape Treatment and Bio-Engineering for Man-made Slopes and Retaining Walls (GEO Publication No. 1/2000)

Guidelines

Buildings Department

- Building Maintenance Guidebook
- Technical Memorandum for Supervision Plans
- Guidelines on Maintenance and Repair of Drainage System and Sanitary Fitments
- Guide on Erection & Maintenance of Advertising Signs
- Guidelines for the Removal of Typical Unauthorized Building Works and General Maintenance of External Walls

Civil Engineering & Development Department

- Layman's Guide to Slope Maintenance
- What to Do when You Receive a Dangerous Hillside Order
- Model Slope Maintenance Plan

Electrical & Mechanical Services Department

- For Your Safety Maintain Your Electrical Installations
- Gas Installation Work and Registered Gas Contractors
- Guidelines on Energy Audit
- Pilot Scheme for Wider Use of Fresh Water in Evaporative Cooling Towers for Energy Efficient Air Conditioning Systems
- Prohibition of Flueless Gas Water Heaters Used of Serve a Bathroom
- Responsibilities of Lift/Escalator Owner under the Lifts and Escalators
- Safe Use of LPG Cylinders
- Technical Guidelines on Grid Connections of small-scale Renewable Energy Power Systems

Environmental Protection Department

- Guidance Notes for the Management of IAQ in Offices and Public Places, 2003
- A guide on IAQ Certification Scheme for Office and Public Place, 2003
- A guide to the Air Pollution Control (Furnaces, Ovens and Chimneys) (Installation and Alternation) Regulation 1999
- A guide to control of Oily Fume and Cooking Odor from Restaurants and Food Business
- A Concise Guide to the Noise Control Ordinance
- How to Apply for a Construction Noise Permit
- Practice Notes on Control of Air Pollution in Semi-Confined Public Transport Interchanges, ProPECC PN 1/98
- Practice Note on Control of Radon Concentration in New Building, ProPECC PN 1/99
- Practice Note on Handling of Asbestos Containing Materials in Buildings (ProPECC PN 2/97)

Home Affairs Department

- Building Management
- Code of Practice on Building Management and Maintenance
- Fire Safety Checklist
- How to Form an Owners' Corporation and Achieve Effective Building Management

Independent Commission Against Corruption

- Clean and Effective Building Management - A Guide on Financial Management for Owners' Corporation
- Corruption Prevention Guide on Building Management
-

Labour Department

- Concise Case Studies on Site Accidents

- Safety Handbook for Site Workers
- Guidance Notes on Fire Safety at Workplaces
- Guidance Notes on Inspection, Thorough Examination and Testing of Lifting Appliances and Lifting Gear
- Guidance Notes on the Inspection, Thorough Examination and Testing of Suspended Working Platforms
- Guidance Notes on Temporary Dumping Jetty
- Guidance Notes on Safety at Work for Maintenance of Low Voltage Electrical Switchgears
- Guidance Notes for the Safe Isolation of Electricity Source at Work
- Chemical Safety in the Workplace - Guidance Notes on Risk Assessment and Fundamentals of Establishing Safety Measures

Planning Department

- Hong Kong Planning Standard and Guidelines
- Sustainable Development for the 21st Century in Hong Kong (SUSDEV 21) related publications

BD, LandsD and PlanD Joint Practice Notes

- JPN No.1 Green and Innovative Building
- JPN No.2 Second Package of Incentives to Promote Green and Innovative Buildings
- JPN No.3 Re-engineering of Approval Process for Land and Buildings Developments

APPENDIX 4. HOW TO USE CEPAS ASSESSMENT FORMS

Examples for a composite building (**Also applicable to solely residential & non-residential buildings):**

Assumptions (Design Stage):

Non-residential building area (A_{D-NR}): 3,000m^2

Residential building area (A_{D-R}): 7,000m^2

Design Stage Non-Residential Building

Design Stage Residential Building

Example 1

Performance Indicators (Pre-Design Stages)

IE 1 Health & Hygiene

Intent To minimise the threat of health and hygiene problems arising from building operation

Criteria Commitment in Client's Project Brief to minimise the threat of health and hygiene problems arising from building operation and usages

Explanation In the concept and planning stage of the Building, the Client is required to include the notion of minimising the threat of health and hygiene problems arising from building operation for the whole life of the Building in the project objectives. Indoor environmental quality shall be covered, but not limited to indoor air quality, thermal comfort, noise and vibration control and visual quality.

The extent of health and hygiene issues shall focus on the provisions and facilities for cleansing and controlling of pollutant / bacteria / virus dispersion. Accessibility for maintenance shall also be taken into consideration in this aspect.

To commit the project objectives, the Client is required to include the objectives in the Project Brief / Design Control Document. The designers and planners are required to plan and design the entire Building in line with the objectives. The environmental performance criteria as described in other CEPAS stages shall be made use as reference in preparing the Project Brief.

The Developers / Building owners or their representative (e.g. Planner/ Project Manager) to commit the environmental performance on this issue will be incorporated in the Project Brief for implementation in the Design, Construction (construction and demolition works) and Operation Stages

✓ **IE 1 Committed**

Example 2

RE 3.1 Renewable Energy Applications (Design Stage)

Common performance scale for sub-criteria
Min. score = 0
Max. score = 3

Performance Indicators

Sub-criteria Performance Scale	Non-residential buildings		Residential buildings	
0	Without application of renewable energy		Without application of renewable energy	
1	Renewable energy used in the Building		Renewable energy used in the Building	
2	≥ 3% of total building energy generated from renewable sources in the Building		≥ 2% of total building energy generated from renewable sources in the Building	
3	≥ 6% of total building energy generated from renewable sources in the Building		≥ 4% of total building energy generated from renewable sources in the Building	
	Non-residential Buildings Score (P_{D-NR})	3	Residential Buildings Score (P_{D-R})	1
			RE 2.1 Score	1.6

Sub-criteria for non-residential buildings

Sub-criteria for residential buildings

IE 3.1 Score $= [P_{D-NR} \times A_{D-NR} + P_{D-R} \times A_{D-R}] / [A_{D-NR} + A_{D-R}]$

$= [3 \times 3{,}000m^2 + 1 \times 7{,}000m^2] / [3{,}000 + 7{,}000\ m^2]$

$= 1.6$

Score for Sub-criteria (S_{sc})

Example 3

NA 2.1 Public Transportation (Design / Operation Stages)

Common criteria for both non-residential and residential buildings

Performance Indicators

Sub-criteria Performance Scale	Non-residential buildings / Residential buildings
0	Public transportation is accessible from any building occupant entrance: 10 minutes < walking time
1	Public transportation is accessible from any building occupant entrance: 5 minutes < walking time ≤ 10 minutes
2	Public transportation is accessible from any building occupant entrance: 2 minutes < walking time ≤ 5 minutes
3	Public transport interchange is accessible within 2 minutes walking distance away from any building entrance
	NA 2.1 Score 2

NA 2.1 Score = 2

(Consideration of area ratio for non-residential building and residential building not required)

Example 4

RE 2.4 Energy Efficiency (Energy Monitoring) (Design Stages)

"Yes" – Satisfy the performance indicator requirements

"No" – Does not satisfy the performance indicator requirements

Scoring table for non-residential portion only

Scoring table for residential portion only

Item	Strategy	Non-residential			Residential		
		No	Yes	N/A	No	Yes	N/A
1	Energy meter(s) for central chiller plant, boiler plant and heat rejection plant and associated water-side system	0	1		-	-	N/A
2	Energy meter(s) for air-side equipment and/or a cluster of split-type air-conditioning u area in floor / zone basis	0	1		0	1	N/A
3	Energy meter(s) for ele landlord / public area in floor / zone basis	0	1		0	1	

"N/A" shall be selected if the system/ provision does not exist in the building

(A)	Total maximum score (applicable items only) in this Sub-criteria	3	(B)	Total score (applicable items only) obtained in this Sub-criteria	2
NON-RESIDENTIAL		Sub-criteria performance score (P_D)		(B)/(A) = P_D	0.66
(A)	Total maximum score (applicable items only) in this Sub-criteria	1	(B)	pplicable items only) Sub-criteria	1
RESIDENTIAL		Sub-criteria performance score (P_D)		(B)/(A) = P_D	1

Score obtained in items 1& 2

Sum of score for items 1& 2
Item 3: no score

Sum of score for item 3 only;
Items 1&2: N/A - not require to be counted;

Score obtained in item 3

Sub-criteria Performance Scale	Non-residential buildings		Residential buildings	
0	$0 \le P_D < 0.25$		$0 \le P_D < 0.25$	
1	$0.25 \le P_D < 0.5$		$0.25 \le P_D < 0.5$	
2	$0.5 \le P_D < 0.75$		$0.5 \le P_D < 0.75$	
3	$0.75 \le P_D \le 1$		$0.75 \le P_D \le 1$	
	Non-residential Buildings Score (P_{D-NR})	2	Residential Buildings Score (P_{D-R})	3
			RE 2.4 Score	2.7

RE 2.4 Score $=[P_{D-NR} \times A_{D-NR} + P_{D-R} \times A_{D-R}] / [A_{D-NR} + A_{D-R}]$
$= [2 \times 3{,}000m^2 + 3 \times 7{,}000m^2] / [3{,}000 + 7{,}000\ m^2]$
$= 2.7$

Example 5

N1 3.1 Impacts to Communities (Design Stage)

Strategy Indicators

Item	Strategy	Non-residential / Residential		
		No	Yes	N/A
1	Carry out social impact assessment for the development	0	1	
2	Carry out one-off consultation with the surrounding residents and building users in the planning / early design stage	0	1	
3	Establish a continuous communication channel between the developer and the surrounding residents and building users	0	1	

(A)	Total maximum score (applicable items only) in this Sub-criteria	3	(B)	Total score (applicable items only) obtained in this Sub-criteria	2
NON-RESIDENTIAL + RESIDENTIAL	Sub-criteria performance score (P_D)		(B)/(A) = P_D		0.67

Sum of score for items 1,2 & 3

Score obtained in items 2 & 3

Common criteria for both non-residential and residential buildings

Sub-criteria Performance Scale	Non-residential / Residential buildings
0	$0 \le P_D < 0.25$
1	$0.25 \le P_D < 0.5$
2	$0.5 \le P_D < 0.75$
3	$0.75 \le P_D \le 1$
Innovation	0 OR 1
NI 3.1 Score	3

NI 3.1 Score =
Score obtained from performance scale (2 obtained) + Innovation (1 obtained) = 3

Example 6

LD 2 Waste Management (Construction Stage)

It means this performance indicator is applicable for building construction works

It means this performance indicator is applicable for building demolition works

Stage	C	D

Requirements	Compliance
This indicator is assigned to reassert the importance of waste reduction issues in the overall building environmental performance. Carry out construction and demolition works with full compliance to the Waste Disposal Ordinance and all relevant regulations from various government departments such as EPD, FEHD, AFCD, etc.	Statutory requirements, no assessment in CEPAS is required.

Example 7

IE 2.1 IAQ Strategies (Construction Stage)

It means this performance indicator is applicable for building construction works

It means this performance indicator is applicable for building demolition works

Item	Strategy			Non-residential / Residential		
				No	Yes	N/A
1	C	D	Design with sufficient quantity of fresh air supply in site office and show room on site	0	1	
2	C	-	Design of commercial kitchen ventilation system within construction site with effective oily fume and odour removal in canteens and food business	0	1	
3	C	-	Implement IAQ management strategies for occupied buildings under construction	0	1	
4	C	D	Use of no/low emitting building & finishing material	0	1	

(A)	Total maximum score (applicable items only) in this Sub-criteria		(B)	Total score (applicable items only) obtained in this Sub-criteria	
NON-RESIDENTIAL + RESIDENTIAL	Sub-criteria performance score (P_C)		(B)/(A) = P_C		

Assessment is not applicable for demolition works, and "N/A" shall be filled in the bracket

Example 8

RE 4.1 Recycled Material Use (Construction Stage)

It means this performance indicator is applicable for building construction works only. Demolition works is not applicable and "N/A" shall be filled in the bracket

Stage	C	-

Sub-criteria Performance Scale	**Non-residential buildings**	**Residential buildings**
0	< 5% of materials & components used with recycled content	< 5% of materials & components used with recycled content
1	≥ 5% of materials & components used with recycled content	≥ 5% of materials & components used with recycled content
2	≥ 10% of materials & components used with recycled content	≥ 10% of materials & components used with recycled content
3	≥ 15% of materials & components used with recycled content	≥ 15% of materials & components used with recycled content
	Non-residential Buildings Score **($P_{C\text{-}NR}$)**	Residential Buildings Score **($P_{C\text{-}R}$)**
		RE 4.1 Score

APPENDIX 5. SUMMARY OF CEPAS CATERGORIES, CRITERIA AND SUB-CRITERIA

Indoor Environmental Quality (IE)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Health & Hygiene	IE1	IE1	IE1.1	IE1	IE1.1	IE1	IE1.1	IE1	IE1.1
IAQ	IE2	IE2		IE2		IE2		IE2	
IAQ Certification			IE2.1						IE2.1
Thermal Comfort			IE2.2						IE2.2
IAQ Strategies			IE2.3		IE2.1		IE2.1		IE2.3
Noise and Acoustic Environment	IE3	IE3	IE 3.1					IE3	IE 3.1
Lighting Environment	IE4	IE4		IE3		IE3		IE4	
Daylighting			IE4.1						IE4.1
Visual Quality & Comfort			IE4.2		IE3.1		IE3.1		IE4.2

Performance Indicators

Strategy Indicators

Performance Indicators (Residential Buildings)
Strategy Indicators (Non-residential Buildings)

Building Amenities (BA)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Safety	BA1	BA1		BA1		BA1		BA1	
Safety Regulations									BA1.1
Safety Management									BA1.2
Management	BA2	BA2		BA2		BA2		BA2	
Building Management			BA2.1		BA2.1		BA2.1		BA2.1
Controllability	BA3	BA3						BA3	
Building Controllability			BA3.1						BA3.1
Serviceability (Maintainability for Operation Stage)	BA4	BA4						BA4	
Building Serviceability			BA4.1						
Essential Maintenance									BA4.1
Regular Inspection									BA4.2
Regular Maintenance									BA4.3
Adaptability	BA5	BA5							
Building Adaptability			BA5.1						
Living Quality	BA6	BA6						BA5	
Liveability			BA6.1						BA5.1

Resources Use (RE)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Energy Consumption	RE1	RE1	RE1.1					RE1	RE1.1
Energy Efficiency	RE2	RE2		RE1	RE1.1	RE1	RE1.1	RE2	
Energy Efficiency (Building)			RE2.1						RE2.1
Energy Efficiency (System Design/ Systems)			RE2.2						RE2.2
Energy Efficiency (Electrical Appliances)			RE2.3						RE2.3
Energy Efficiency (Energy Monitoring)			RE2.4						RE2.4
Energy Audit									RE2.5
Use of Renewable Energy	RE3	RE3						RE3	
Renewable Energy Applications			RE3.1						RE3.1
Water Conservation	RE4	RE4		RE2		RE2		RE4	
Greywater Recycling			RE4.1						RE4.1
Rainwater Recycling			RE4.2						RE4.2
Water Conservation Strategies			RE4.3		RE2.1		RE2.1		RE4.3
Timber Use	RE5	RE5		RE3		RE3		RE5	
Sustainable Timber Use			RE5.1						RE5.1
Timber for Temporary Use					RE3.1		RE3.1		
Minimization of Timber Use					RE 3.2				
Material Use	RE6	RE6		RE4		RE4		RE6	
Recycled Material Use			RE6.1		RE4.1				RE6.1
Environmentally-Friendly Materials			RE6.2		RE4.4				RE6.2
Construction Waste Recycling					RE4.2				

	Demolition Waste Recycling							RE4.3		
Building Reuse		RE7	RE7							
	Reuse of Building Structure			RE7.1						

Loadings (LD)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Pollution	LD1	LD1		LD1		LD1		LD1	
Air Pollution			LD1.1		LD1.1		LD1.1		LD1.1
Water Pollution					LD1.2		LD1.2		LD1.2
Noise Pollution					LD1.3		LD1.3		
Waste Management	LD2	LD2		LD2		LD2		LD2	
C & D Waste Management			LD2.1		LD2.1		LD 2.1		
Waste Sorting & Storage			LD2.2						LD2.1

Site Amenities (SA)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Inclusion	SA1	SA1						SA1	
Social Interaction			SA1.1						SA1.1
Connectivity			SA1.2						SA1.2
Landscape	SA2	SA2	SA2.1	SA1		SA1		SA2	SA2.1
Tree Preservation					SA1.1		SA1.1		
Cultural Character	SA3	SA3	SA3.1					SA3	SA3.1
Building Economics	SA4	SA4	SA4.1						
Security	SA5	SA5	SA5.1	SA2	SA2.1	SA2	SA2.1	SA4	SA4.1

Neighbourhood Amenities (NA)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria		Sub-Criteria	Criteria	Sub-Criteria	Criteria	Criteria	Sub-Criteria
Provisions for Community	NA1	NA1	NA1.1					NA1	NA1.1
Transportation	NA2	NA2						NA2	
Public Transportation			NA2.1						NA2.1
Green Transport			NA2.2						NA2.2
Sustainability Economics	NA3	NA3	NA3.1	NA1	NA1.1	NA1	NA1.1		

Site Impacts (SI)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Site Environment	SI1	SI1						SI1	
Site Investigation			SI1.1						
Healthy Environment			SI1.2						SI1.1
Microclimate			S1.3						
Nature Conservation	SI2	SI2		SI1	SI1.1	SI1	SI1.1		
Habitat			SI2.1						
Biodiversity			SI2.2						
Heritage Conservation	SI3	SI3	SI3.1	SI2	SI2.1	SI2	SI2.1		
Buildability	SI4	SI4	SI4.1	SI3	SI3.1				

Neighbourhood Impacts (NI)

CEPAS Performance & Strategy Indicators	Building Stage								
	Pre-Design	Design		Construction				Operation	
				Construction Works		Demolition Works			
	Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria	Criteria	Sub-Criteria
Environmental Impact Assessment	NI1	NI1		NI1		NI1			
Environmental Interactions	NI2	NI2	NI2.1	NI2		NI2		NI1	NI1.1
Environmental Nuisance					NI2.1		NI2.1		
Impacts to Communities	NI3	NI3	NI3.1	NI3	NI3.1	NI3	NI3.1		

APPENDIX 6. SUMMARY OF CEPAS INDICATORS

PRE - DESIGN STAGE		
Criteria		**Intent**
Indoor Environmental Quality (IE)		
IE 1	Health & Hygiene	Enhance of health and hygiene
IE 2	Indoor Air Quality	Maintain the environment of occupied space with good indoor air quality
IE 3	Noise and Acoustic Environment	Minimise the noise nuisance affecting building occupants
IE 4	Lighting Environment	Create a comfort visual environment by means of energy saving operations
Building Amenities (BA)		
BA 1	Safety	Provide a safe habitation and working environment for building occupants and users
BA 2	Management	Design the building and its facilities ease of effective management
BA 3	Controllability	Design the building and its facilities ease of effective control and operation
BA 4	Serviceability	Design the building and its facilities ease of effective maintenance
BA 5	Adaptability	Design the building and its facilities with high adaptability in usage changes
BA 6	Living Quality	Design and provide better spatial and facility provisions in building to enhance the living quality
Resources Use (RE)		
RE 1	Energy Consumption	Reduce the overall building energy consumption of the planned Building
RE 2	Energy Efficiency	Enhance the energy efficiency of the planned Building and its systems
RE 3	Use of Renewable Energy	Encourage the use of renewable energy technology to reduce environmental impacts associated with fossil fuel use
RE 4	Water Conservation	Minimise water consumption and wastage, and to reuse water in an appropriate way
RE 5	Timber Use	Reduce the use of timber and encourage the use of timber from sustainable source
RE 6	Material Use	Reduce material consumption and to encourage the use of recycled materials
RE 7	Building Reuse	Encourage refurbishment of building to reduce the amount of resources use and waste generation
Loadings (LD)		
LD 1	Pollution	Minimise and mitigate outdoor air, noise and water pollution and the subsequent health and environmental impact
LD 2	Waste Management	Encourage best practices in waste management, including sorting, recycling and disposal of municipal, construction and demolition waste
Site Amenities (SA)		
SA 1	Inclusion	Provide optimum spatial arrangements and facilities to enhance the sense of inclusion for all building occupants and users

Criteria		Intent
SA 2	Landscape	Design and provide greenery sensitive boundary treatment and landscape features within a site
SA 3	Cultural Character	Provide a cultural character to the Building and its occupants and users
SA 4	Building Economics	Encourage comprehensive and life-cycle building economic considerations in building development
SA 5	Security	Provide effective security to the Building and its occupants and users
Neighbourhood Amenities (NA)		
NA 1	Provisions for Community	Provide spatial and facility provisions in the Building that benefits to the community
NA 2	Transportation	Provide convenient and sustainable transportation services within or around the Building
NA 3	Sustainability Economics	Recognise the effort of the additional expenditure on improving environmental and social performance
Site Impacts (SI)		
SI 1	Site Environment	Consider existing environmental conditions of the land and its surroundings
SI 2	Nature Conservation	Conserve and enhance the natural environment by preserving landscape resources and protecting the ecological value of the site
SI 3	Heritage Conservation	Conserve and protect archaeological and historic buildings, monuments, components and artefacts
SI 4	Buildability	Design and construct the building and its facilities ease of construction and less materials used, and encourage the use of innovative construction technology to enhance buildability
Neighbourhood Impacts (NI)		
NI 1	Environmental Impact Assessment	Avoid environmental impacts and to mitigate adverse effects due to environmental impacts of the Building
NI 2	Environmental Interactions	Minimise adverse environmental impacts the surrounding buildings and streets due to the Building form and arrangements
NI 3	Impacts to Communities	Encourage public participatory approached planning, and to minimize social problems generated from the building that cause adverse impacts to the community and surroundings

DESIGN STAGE

Criteria		Sub-criteria	Indicators	N	R	
Indoor Environmental Quality (IE)						
IE 1	Health & Hygiene	IE 1.1 Health & Hygiene	Good ventilation in common corridors and lift lobbies in a building	√	√	Strategy
			Space provision in landlord area to provide cleansing facilities and storage space for cleansing equipment	√	√	
			Divert some of the wastewater from a waste fitment to the U-trap of floor drains in the drainage system design in lavatories and bathrooms	√	√	
			Sufficient air relief / transfer air provided in lavatories and bathrooms when mechanical air extraction is used	√	√	
			Avoid designing narrow and deep re-entrant in high rise resident building		√	
			Design a good cooling tower, hot water system and associated water treatment system with efficient operation and minimisation of health risk	√		
			Innovative method to enhance the health and hygiene conditions of the building	√	√	
IE 2	IAQ	IE 2.1 IAQ Certification	Building designed to achieve the relevant criteria in the EPD IAQ Certification Scheme and with good fresh air intake locations	√	√	Performance
		IE 2.2 Thermal Comfort	Design and maintain good thermal comfort in occupied space using Predicted Mean Vote by considering the hottest and coldest months of a year	√	√	Performance
		IE 2.3 IAQ Strategies	Survey of baseline outdoor air quality of the site to compare the findings with the EPD outdoor air quality objectives	√	√	Strategy
			Design with sufficient fresh air supply in HVAC systems	√		
			Design with good natural ventilation in habitable rooms and kitchens		√	
			Design of effective ventilation system in car parks and semi-confined public transport Interchanges	√	√	
			Dedicated exhaust air duct for pollutant generating area	√		
			Design of commercial kitchen ventilation system with effective oily fume and odour removal in restaurants and food business	√		
			Design as non-smoking building or provide with dedicated smoking facilities	√		
			Specify in Tender Specifications for the use of low emission materials	√	√	
			Specify in Tender Specifications for IAQ measurements, air duct cleanliness and building flushing out at building handover stages	√		
			Specify IAQ plan and IAQ issues in O& M manual in Tender Specification	√	√	
			Innovative method to further improve IAQ design	√	√	
IE 3	Noise and Acoustic Environment	IE 3.1 Noise and Acoustic Environment	Consideration of background sound level and to meet the recommended room criteria.	√	√	Strategy
			Good design to provide an indoor environment with high acoustic quality	√	√	

Criteria		Sub-criteria	Indicators	N	R	
			Design for good vibration level and an isolated indoor environment	√	√	
			Design for proper indoor acoustic environment for the intended purposes	√	√	
			Design for sufficient noise insulation	√	√	
			Innovative method to further improve the indoor noise and acoustic environment during building operation period	√	√	
IE 4	Lighting Environment	IE 4.1 Daylighting (Performance for Residential and Strategy for Non-residential)	Vertical Daylight Factor of habitable rooms and kitchen		√	Strategy/ Performance
			Design with appropriate room depth	√		
			Design with sufficient Vertical Daylight Factor (not less than 30%)	√		
			Provide with view	√		
		IE 4.2 Visual Quality & Comfort	Daylight comfort and quality	√		Strategy
			Artificial lighting comfort and quality	√		
			Lighting for energy conservation	√	√	
			Innovative design to further improve visual comfort and lighting energy efficiency	√	√	
Building Amenities (BA)						
BA 1	Safety	Provide a safe habitation and working environment for building occupants and users		√	√	Pre-requisite
BA 2	Management	BA 2.1 Building Management	Major design companies used have an accredited quality management system – ISO 9000 standard	√	√	Strategy
			Specify that accreditation to the ISO 9000 quality management system is one of the requirements in the tender pre-qualification for the major contractor companies	√	√	
			Major design companies used have an accredited environmental management system – ISO 14000 standard	√	√	
			Specify that accreditation to the ISO 14000 environmental management system as one the requirements in the tender pre-qualification of the major contractor companies	√	√	
			Specify that accreditation to the OHSAS 18001 occupational health & safety management system as one the requirements in the tender pre-qualification of major contractor companies	√	√	
			Specify in the Tender Specification that scheduled training for various building facilities and services installations to be provided by contractors and suppliers for the future building operator	√	√	
			Specify comprehensive building records in the Tender Specification	√	√	
			Innovative method to further improve the effectiveness of future building management by building operator	√	√	
BA 3	Controllability	BA 3.1 Building Controllability	Capability for partial operation of building facilities & systems	√	√	Strategy
			Capability for control over major environmental systems by building users	√		

Criteria		Sub-criteria	Indicators	N	R	
			Design with comprehensive & automatic monitoring system for the operating status of major electrical and mechanical installations	√	√	
			Design with comprehensive & automatic control system for the operation of major electrical and mechanical installations	√	√	
			Design with comprehensive & automatic control & monitoring system for the operation of major lighting installations	√	√	
			Specify comprehensive and effective testing and commissioning in the Tender Specification	√	√	
BA 4	Serviceability	BA 4.1 Building Serviceability	Design with convenient and safe access for inspection and cleansing of spaces throughout the building	√	√	Strategy
			Design with convenient and safe access for inspection and maintenance of all building facilities, building envelope and slope	√	√	
			Design with convenient and safe access for inspection and maintenance of building services installations	√	√	
			Design with sufficient and convenient maintenance access for air duct cleansing	√	√	
			Design with convenient & nuisance-free operation & desludging of grease trap	√		
			Design with utility services tunnel for large site which contained a cluster of buildings	√	√	
			Package type air-conditioning units designed at accessible positions	√	√	
BA 5	Adaptability	BA 5.1 Building Adaptability	Design with minimum provisions in saleable/ rental areas to minimize waste generation	√	√	Strategy
			Design of interior space with good spatial adaptability and flexibility	√		
			Design of building structure with good spatial adaptability and flexibility	√		
			Design of mechanical services with good system adaptability and flexibility	√		
			Design of electrical services with good system adaptability and flexibility	√	√	
			Design of communication services with good system adaptability and flexibility	√	√	
BA 6	Living Quality	BA 6.1 Liveability	Design with balcony for residential flats		√	Strategy
			Design with above minimum spatial or environmental provisions in common corridors and lift lobbies		√	
			Design with communal gardens, such as podium or roof garden, for use by the building occupants and users	√	√	
			Design with other innovative green features to improve living quality	√	√	
Resources Use (RE)						
RE 1	Energy Consumption	RE 1.1 Energy Consumption	Achieve higher levels of building energy performance and reduce annual energy consumption above the recognised local standards. Reduce environmental impacts associated with excessive energy use in the whole life of building.	√	√	Performance
RE 2	Energy Efficiency	RE 2.1 Energy Efficiency (Building)	Consideration of built form and building orientation to enhance energy conservation	√	√	Strategy
			Consideration of optimum spatial planning to enhance energy conservation	√	√	

Criteria		Sub-criteria	Indicators	N	R	
			Provisions of fixed or movable horizontal / vertical external shading device	√	√	Strategy
			Consideration of building or provisions of building features permeability to enhance the use of natural ventilation	√	√	
			Provisions of movable external shading device for major atrium facade window or skylight	√	√	
			Provisions of innovative fixed type or automatic internal shading device that is able to reduce solar heat gain to the occupied area	√	√	
		RE 2.2 Energy Efficiency (Systems)	Use of evaporative cooling towers or other means of water-cooled heat rejection methods as the major heat rejection equipment for the building.	√	√	Strategy
			Use of energy recovery system	√	√	
			Use of variable speed drive for fans in appropriate systems if operating energy saving can be achieved	√	√	
			Use of variable speed drive for pumps in appropriate systems if operating energy saving can be achieved	√	√	
			Use of electronic ballasts for all fluorescent lamps	√	√	
			Other innovative / effective energy efficient systems	√	√	
		RE 2.3 Energy Efficiency (Electrical Appliances)	Specify all electrical appliances and equipment complied with Grade 2 or better as defined in the EMSD Energy Efficiency Labelling Scheme for Household Appliances and Office Equipment / Multi-function Device for all landlord and sellable areas	√	√	Strategy
			Specify all electrical appliances and equipment complied with Grade 1 as defined in the EMSD Energy Efficiency Labelling Scheme for Household Appliances and Office Equipment / Multi-function Device for all landlord areas	√	√	
			Specify all electrical appliances and equipment complied with Grade 1 as defined in the EMSD Energy Efficiency Labelling Scheme for Household Appliances and Office Equipment/ Multi-function Device for all sellable areas	√	√	
		RE 2.4 Energy Efficiency (Energy Monitoring)	Energy meter(s) for central chillier plant, boiler plant and heat rejection plant and associated water-side system	√		Strategy
			Energy meter(s) for air-side equipment and/or a cluster of split-type air-conditioning units serving landlord / public area in floor / zone basis	√	√	
			Energy meter(s) for electric lighting system serving landlord / public area in floor / zone basis	√	√	
RE 3	Use of Renewable Energy	RE 3.1 Renewable Energy Applications	Encourage use of renewable energy technology to reduce environmental impacts associated with fossil fuel energy use	√	√	Performance
RE 4	Water Conservation	RE 4.1 Greywater Recycling	Recycle and reuse greywater in order to reduce the consumption of fresh and flushing water	√	√	Performance
		RE 4.2 Rainwater Recycling	Recycle and reuse rainwater in order to reduce the consumption of fresh water	√	√	Performance
		RE 4.3 Water Conservation Strategies	Use of low flow/ automatic / semi-automatic (cistern type) water closet	√	√	Strategy
			Use of automatic / manual flow control faucet	√		

Criteria		Sub-criteria	Indicators	N	R	
			Use of automatic / manual flow control valve for urinal	√		
			Use of water saving shower head	√	√	
			Use of shower head instead of bath tub		√	
			Use of water saving irrigation system	√	√	
			Use of other water saving device or innovative design to reduce water consumption	√	√	
RE 5	Timber Use	RE 5.1 Timber Use	Use of timber from sustainable source	√	√	Performance
RE 6	Material Use	RE 6.1 Recycled Material Use	Reduce material consumption and reduce demands on limited reserves of natural resources by using recycled materials	√	√	Performance
		RE 6.2 Environmentally-Friendly Materials	Encourage use of environmentally - friendly building materials to reduce environmental impacts.	√	√	Performance
RE 7	Building Reuse	RE 7.1 Reuse of Building Structure	Reuse of existing building structure for new built building, large scale refurbishment and building usage change	√	√	Performance
Loadings (LD)						
LD 1	Pollution	Minimise outdoor pollution and the subsequent health and environmental impacts under global and local considerations		√	√	Pre-requisite
		LD 1.1 Air Pollution	All thermal insulations used for building fabric are CFC/HCFC free	√	√	Strategy
			All thermal insulations used for water pipes and air ducts are CFC/HCFC free	√	√	
			All refrigerants used are zero ozone depleting potential	√	√	
			No toilet exhaust outlet located facing any kitchen / living room / bedroom openings directly in 5 metres at open space or within a light well		√	
			No refuse storage room opening located facing any kitchen / living room / bedroom openings directly in 5 metres at open space or within a light well		√	
			Innovative method to reduce air pollution substantially	√	√	
LD 2	Waste Management	Reduce waste generation, disposal and associated environmental impacts		√	√	Pre-requisite
		LD 2.1 C&D Waste Management	Implementation of effective construction and demolition waste management plan to reduce, recycle and reuse C&D waste	√	√	Performance

Criteria		Sub-criteria	Indicators	N	R	
		LD 2.2 Waste Sorting & Storage	Designated centralised space and facilities for sorting and storage of recyclable and non-recyclable waste designed	√	√	Strategy
			Designated space(s) and facilities per floor for sorting and storage of recyclable and non-recyclable waste designed	√	√	
			Provision of automatic sorting and storage facility for recyclable and non-recyclable for each building / whole site designed	√	√	
			Provision of self-closing type air tight system to store organic waste that may leads to bad smell and hygienic problem provided	√	√	
			Innovative method to reduce waste generation or effective waste management due to building operation	√	√	
Site Amenities (SA)						
SA 1	Inclusion	SA 1.1 Social interaction	Design with open /covered / enclosed common space with facilities to harmonise the space use by all building occupants and users within the site	√	√	Strategy
			Enhanced barrier free access for disabled and aged persons	√	√	
			Innovative method to further enhance the effectiveness of social interaction	√	√	
		SA 1.2 Connectivity	Large communal leisure and recreational facilities are directly accessible by walking within 15 minutes via safe pedestrian path	√	√	
			Common space within the site is designed with covered and comfortable pedestrian connections to open space, main entrance and building facilities	√	√	
			Innovative method to further enhance the effectiveness of spatial connectivity	√	√	
SA 2	Landscape	SA 2.1 Landscape	Design with communal landscaped areas on ground level	√	√	Strategy
			Design with landscape for slope and retaining wall within the site	√	√	
			Design to preserve and reuse all existing healthy trees within the site	√	√	
			Design with a biotope within the site and encourage planting native species	√	√	
			Setting back of building ground level to allow street side tree planting	√	√	
			Innovative measures to provide or enhance landscape features	√	√	
SA 3	Cultural Character	SA 3.1 Cultural Character	Design a building with a distinctive cultural character	√	√	Performance
SA 4	Building Economics	SA 4.1 Building Economics	Comprehensive and life-cycle building economic considerations in building development	√	√	Performance
SA 5	Security	SA 5.1 Security	Design of space with minimal risk for building occupants and users	√	√	Strategy
			Design with effective passive security facilities	√	√	
			Design with provisions for active security measures	√	√	
			Design with innovative measures to enhance security	√	√	

Criteria		Sub-criteria	Indicators	N	R	
Neighbourhood Amenities (NA)						
NA1	Provisions for Community	NA 1.1 Provisions for Community	Carry out amenity conflict appraisal to evaluate the communal services provided in the surroundings	√	√	Strategy
			Provisions within the site or having relevant provisions existed in the immediate neighbouring sites to support communal and social services	√	√	
			Provisions within the site or having relevant provisions existed in the immediate neighbouring sites to support the community on convenient services	√	√	
NA2	Transportation	NA 2.1 Public Transportation	Building designed to encourage the use of public transport instead of private car	√	√	Performance
		NA 2.2 Green Transport	Covered bicycle parking area is designed within the site if public bicycle path is available nearby the site	√	√	Strategy
			Design of vehicle access to building with minimal traffic impacts to the surrounding	√	√	
			Design with elevated / safe pedestrian path to the nearby public transport facilities	√	√	
			Provision for future car pool facilities for building occupants / without vehicle parking area in the building	√	√	
			Other innovative method to further reduce environmental impact due to transportation and to enhance convenient transportation services	√	√	
NA3	Sustainability Economics	NA 3.1 Sustainability Economics	Financial contribution percentage on improving environmental & Social related building performance	√	√	Performance
Site Impacts (SI)						
SI 1	Site Environment	Design the site layout and building arrangements with minimum impacts on the environmental performance within the site		√	√	Pre-requisite
		SI 1.1 Site Investigation	Local climatic data surveyed before planning of site arrangement	√	√	Strategy
			Local baseline environmental data surveyed before planning of site arrangement	√	√	
			Local topographic conditions surveyed before planning of site arrangement	√	√	
			Carry out other innovative method to enhance the performance of site investigation	√	√	
		SI 1.2 Healthy Environment	Design to optimise daylight access to buildings within the site and the view to surroundings by effective site layout and building design	√	√	Strategy
			Design to provide effective natural ventilation and wind permeability within the site by effective site layout and building design	√	√	
			Design to provide effective noise mitigation measures within the site by effective site layout and building design	√	√	
			Design to optimise the sunlight penetration within the site by effective site layout and building design	√	√	

Criteria		Sub-criteria	Indicators	N	R	
			Carry out other innovative building arrangement analysis/ design to enhance the overall building environmental quality within and around the site	√	√	
		SI 1.3 Microclimate	Carry out site arrangement analysis with considerations of outdoor thermal comfort within the site	√	√	Strategy
			Carry out site arrangement analysis with considerations of pedestrian wind comfort within the site	√	√	
			Carry out site arrangement analysis with considerations of outdoor visual comfort and solar heat gain within the site	√	√	
			Carry out other innovative site arrangement analysis to enhance the overall microclimate performance	√	√	
SI 2	Nature Conservation	SI 2.1 Habitat	Conserve and enhance the natural environment by protecting the ecological value of the site in terms of habitat	√	√	Performance
		SI 2.2 Biodiversity	Conserve and enhance the natural environment by protecting the ecological value of the site in terms of biodiversity	√	√	Performance
SI 3	Heritage Conservation	SI 3.1 Heritage Conservation	Carry out preliminary site appraisal on cultural heritage	√	√	Strategy
			Preserve heritage components for reuse on site / convey to ArchSD / reuse of heritage components from another site	√	√	
			Preserve the majority portion of buildings with cultural heritage value on site	√	√	
			Design of building foundation and structure and specify appropriate construction method to minimize adverse structural and environmental impacts towards the immediate adjacent building(s) with cultural heritage value in the future construction process	√	√	
			Innovative method to implement heritage conservation on site	√	√	
SI 4	Buildability	SI 4.1 Buildability	Widely use of modular structure in building	√	√	Strategy
			Widely use of non-structural prefabricated external wall	√	√	
			Widely use of precast structure other than external wall	√	√	
			Widely use of full precast module	√	√	
			Widely use of integrated services module	√	√	
			Use of other precast components in building	√	√	
			Use of other improved and innovative building technology to enhance the buildability and minimise environmental impacts	√	√	
Neighbourhood Impacts (NI)						
NI 1	Environmental Impact Assessment	Avoid environmental impacts and to minimise and control adverse effects due to environmental impacts of the Building		√	√	Pre-requisite

Criteria		Sub-criteria	Indicators	N	R	
NI 2	Environmental Interactions	NI 2.1 Environmental Interactions	Carry out building arrangement analysis with considerations of minimising daylight and view impacts and to enhance the performance towards the surrounding buildings and open areas	√	√	Strategy
			Carry out building arrangement analysis with considerations of minimising ventilation barrier and to enhance natural ventilation performance and wind permeability to surrounding buildings and open areas	√	√	
			Carry out building design appraisal with considerations of minimising outdoor air quality impacts and to enhance the air quality to the surrounding buildings and open areas	√	√	
			Carry out building design appraisal with considerations of minimising noise impacts and to enhance the acoustic quality to the surrounding buildings and open areas	√	√	
			Carry out building design appraisal with considerations of minimising visual impacts and to enhance the visual quality to the surrounding buildings and open areas	√	√	
			Carry out other innovation analysis & subsequent design to enhance environmental interaction	√	√	
NI 3	Impacts to Communities	NI 3.1 Impacts to Communities	Carry out social impact assessment for the development	√	√	Strategy
			Carry out once-off consultation to the surrounding residents and building users in the planning / early design stage	√	√	
			Establish a continuous communication channel between the developer and the surrounding residents and building users	√	√	
			Carry out other innovative method to reduce social impact to community	√	√	

CONSTRUCTION STAGE

Categories		Sub-criteria	Indicators	C	D	N	R	
Indoor Environmental Quality (IE)								
IE 1	Health & Hygiene	IE 1.1 Health& Hygiene	Space provision for cleansing facilities and storage of cleansing equipment	√	√	√	√	Strategy
			Regular cleansing and good housekeeping in toilets and site office	√	√	√	√	
			Hygiene management plan for construction / demolition site	√	√	√	√	
			Designated person to inspect the site regularly to identify health and hygienic problem areas	√	√	√	√	
			Provide training and information on health and hygiene issues to construction site staff	√	√	√	√	
			Use of no / low emission cleaning products	√	√	√	√	
IE 2	IAQ	IE 2.1 IAQ Strategies	Design with sufficient quantity of fresh air supply for the site office and show room on site	√	√	√	√	Strategy
			Design of commercial kitchen ventilation system within construction site with effective oily fume and odour removal in canteens and food business	√		√	√	
			Implement IAQ management strategies for occupied buildings under construction	√		√	√	
			Use of no/low emitting building and furnishing materials	√		√	√	
			Innovative method to further improve IAQ in construction / demolition site	√	√	√	√	
IE 3	Lighting Environment	IE 3.1 Visual Quality & Comfort	Design of lighting with optimum illuminance and glare control for in site office.	√	√	√	√	Strategy
			Design with daylight and electric lighting integration in site office and allow more daylight access to the interior	√	√	√	√	
			Use of T5 fluorescent lamps in site office	√	√	√	√	
			Innovative method to further improve the indoor visual comfort and lighting energy efficiency within construction site	√	√	√	√	
Building Amenities (BA)								
BA1	Safety	Provide a safe habitation and working environment in and around a construction / demolition site		√	√	√	√	Pre-requisite
BA2	Management	BA 2.1 Building Management	Major contractors for the construction / demolition projects are accredited with ISO 9000 quality management system	√	√	√	√	Strategy
			Major contractors for the construction / demolition projects are accredited with ISO 14000 environmental management system	√	√	√	√	
			Major contractors for the construction / demolition projects are accredited with OHSAS 18001 occupational health and safety management system	√	√	√	√	
			Environmental training provided for the major contractors' management and supervisory staff at the early stage of construction / demolition process	√	√	√	√	

C – Applicable for Construction Works
D – Applicable for Demolition Works
N – Applicable for Non-residential Building
R – Applicable for Residential Building

Categories		Sub-criteria	Indicators	C	D	N	R	
			Environmental training provided for the construction workers at the early stage of construction / demolition process	√	√	√	√	Strategy
			Comprehensive building records provided and conveyed to building operator and designer with satisfaction	√		√	√	
			Comprehensive and effective testing and commissioning works provided and satisfy the designer's requirements	√		√	√	
			Scheduled trainings of various building facilities and services installations provided by the contractors and suppliers to the building operators	√		√	√	
			Innovative method to further improve the construction / demolition management effectiveness	√	√	√	√	
Resources Use (RE)								
RE1	Energy Efficiency	RE 1.1 Energy Efficiency	Formulation and implementation of an overall energy management strategy for the construction / demolition site	√	√	√	√	Strategy
			Formulation and implementation of an overall energy management strategy for the site office	√	√	√	√	
			Formulation and implementation of a lighting operation strategy to minimise unnecessary lighting operation in the construction / demolition site at night	√	√	√	√	
			Minimum 50% of all electrical appliances and equipment used in site offices complied with Grade 2 or better as defined in the EMSD Energy Efficiency Labelling Scheme for Household Appliances and Office Equipment / Multi-function Device for site office and sale areas	√	√	√	√	
			Minimum 50% of all electrical appliances and equipment used in sale office and show room on construction site complied with Grade 2 or better as defined in the EMSD Energy Efficiency Labelling Scheme for Household Appliances and Office Equipment / Multi-function Device for site office and sale areas	√	√	√	√	
			Use of renewable energy in the construction / demolition site	√	√	√	√	
			Modification of the design and to facilitate construction / demolition methods or sequence that can reduce energy consumption during construction process	√	√	√	√	
RE2	Water Conservation	RE 2.1 Water Conservation Strategies	Use of low flow water closet in construction site office	√	√	√	√	Strategy
			Use of automatic / manual flow control faucet and control valve for urinal in site office	√	√	√	√	
			Use of low flow water closet in sale office & show room on construction site	√		√	√	
			Use of automatic / manual flow control faucet and control valve for urinal in sale office & show room on construction site	√		√	√	
			Collection of rainwater for reuse within construction / demolition site	√	√	√	√	
			Use of other water saving device or innovative idea to reduce water consumption in construction / demolition site	√	√	√	√	
RE3	Timber Use	RE 3.1 Timber for Temporary Use	Reduce the use of timber for temporary use	√	√	√	√	Performance

		RE 3.2 Minimization of Timber Use	Minimize the use of timber during construction	√		√	√	Performance
Categories		**Sub-criteria**	**Indicators**	**C**	**D**	**N**	**R**	
RE4	Material Use	RE 4.1 Recycled Material Use	Reduce material consumption and reduce demands on limited reserves of natural resources by the use of recycled materials.	√		√	√	Performance
		RE 4.2 Construction Waste Recycling	To recycle construction waste generated in building construction process	√		√	√	Performance
		RE 4.3 Demolition Waste Recycling	To recycle demolished materials generated in building demolition process		√	√	√	Performance
		RE 4.4 Environmentally-Friendly Materials	Use of environmentally -friendly building materials to reduce environmental impacts.	√		√	√	Performance
Loadings (LD)								
LD1	Pollution	Minimise outdoor pollution and the subsequent health and environmental impacts under global and local considerations		√	√	√	√	Pre-requisite
		LD 1.1 Air Pollution	Construction / demolition site air pollution and dust control management plan formulated and implemented by Contractor	√	√	√	√	Strategy
			Site personnel(s) are designated to carry out regular inspections on the effectiveness of air pollution control measures, and to carry out dust control in construction / demolition site	√	√	√	√	
			Construction / demolition works that leads to significant amount of dust generation shall be provided with proper sheltering to minimise dust spread	√	√	√	√	
			To store dusty materials in enclosed area, to carry out dusty material mixing works within sufficient sheltering, and to perform dust suppression measures to minimise dust spread	√		√	√	
			All refrigerants used for air-conditioning systems in site office are zero ozone depleting potential	√	√	√	√	
			Other innovative method to further reduce air pollution generated from construction / demolition process	√	√	√	√	
		LD 1.2 Water Pollution	Construction / demolition site water pollution management plan formulated and implemented by Contractor	√	√	√	√	Strategy
			Site personnel(s) designated to carry out regular inspection and on the effectiveness of water pollution control measures	√	√	√	√	
			Separate rainwater drainage path is provided such that contaminated waste water discharge to rainwater system can be avoided	√	√	√	√	
			Minimisation and treatment of wastewater from building construction / demolition	√	√	√	√	

			Reuse of washing water and providing silt removal facilities before discharged to drain	√	√	√	√	
			Soil and waste water from construction site toilets discharged to government sewer	√	√	√	√	
Categories		**Sub-criteria**	**Indicators**	**C**	**D**	**N**	**R**	
			Effective grease trap is provided for each site canteen	√		√	√	
			Other innovative method to further reduce water pollution generated from construction / demolition process	√	√	√	√	
		LD 1.3 Noise Pollution	Formulation and implementation of a good management plan for the control of noise pollution at the construction / demolition site.	√	√	√	√	Strategy
			Designation of site personnel(s) for conducting regular inspection on the effectiveness of noise control measures.	√	√	√	√	
			Reduce noise from construction activities based on EPD non-statutory requirements	√		√	√	
			Other innovative method to further reduce noise pollution generated from construction process	√	√	√	√	
LD2	Waste Management	Reduce waste generation, disposal and associated environmental impacts		√	√	√	√	Pre-requisite
		LD 2.1 C&D Waste Management	Contractor established and implemented a construction, demolition & municipal waste management plan in construction / demolition site	√	√	√	√	Strategy
			Designated person(s) to inspect the implementation effectiveness on various waste management strategies regularly	√	√	√	√	
			Designated centralised space(s) and facilities for sorting and storage of recyclable and non-recyclable waste specified	√	√	√	√	
			Provision of air tight system to store organic waste that may leads to bad smell and hygienic problem	√	√	√	√	
			Innovative method to reduce waste generation or effective waste management in construction / demolition site	√	√	√	√	
Site Amenities (SA)								
SA1	Landscape	SA 1.1 Tree Preservation	Effectiveness of tree preservation and protection measures provide by Contractor in site (for all designated trees retain on the original locations or other places)	√	√	√	√	Performance
SA2	Security	SA 2.1 Security	Effective passive security facilities provided in construction / demolition site	√	√	√	√	Strategy
			Effective active security measures provided in construction / demolition site	√	√	√	√	
			No construction materials / demolished salvageable materials lose reported to police throughout the entire construction period	√	√	√	√	
Neighbourhood Amenities (NA)								

NA1	Environmental Economics	NA 1.1 Environmental Economics	Financial contribution percentage on improving environmental & Social related construction site performance	√	√	√	√	Performance
Categories		**Sub-criteria**	**Indicators**	**C**	**D**	**N**	**R**	
Site Impacts (SI)								
SI 1	Nature Conservation	SI 1.1 Natural Conservation	If habitat ecological value was identified on site in the Design / Pre-design Stage and designed to conserve, sufficient protection measures are provided by Contractor	√	√	√	√	Strategy
			If biodiversity ecological value was identified on site in the Design / Pre-design Stage and designed to conserve, sufficient protection measures are provided by Contractor	√	√	√	√	
			Contractor established a site ecological value protection strategy in the early stage of construction / demolition work	√	√	√	√	
SI 2	Heritage Conservation	SI 2.1 Heritage Conservation	Contractor established a site cultural heritage protection strategy in the early stage of construction / demolition work	√	√	√	√	Strategy
			If buildings, monuments, components and artefacts with cultural heritage value were identified on site in the Design / Planning Stage and designed / planned to conserve, sufficient protective measures are implemented by Contractor	√	√	√	√	
			Contractor established preventive measures to minimize adverse structural and environmental impacts towards the immediate adjacent building(s) with natural heritage value	√	√	√	√	
SI 3	Buildability	SI 3.1 Buildability	Widely use of precast structure other than that specified in the Design Stage	√		√	√	Strategy
			Widely use of full precast module and / or integrated services module other than that specified in the Design Stage	√		√	√	
			Use of other precast components in building other than that specified in the Design Stage	√		√	√	
			Use of other improved and innovative building technology to enhance the buildability and minimise environmental impacts	√		√	√	
Neighbourhood Impacts (NI)								
NI 1	Environment Impact Assessment	Avoid environmental impacts and to minimise and control the adverse effects due to environmental impacts during the construction / demolition process		√	√	√	√	Pre-requisite
NI 2	Environmental Interactions	NI 2.1 Environmental Nuisance	Designate a proper site material storage area to minimise nuisance to the surroundings	√	√	√	√	Strategy
			Designate a proper hoisting facilities locations to minimise the risk to the surroundings	√	√	√	√	
			Implement other environmental nuisance control measures in construction / demolition site	√	√	√	√	
NI 3	Impact to communities	NI 3.1 Impact to communities	Contractor to identify the potential sensitive receivers nearby the site due to construction / demolition activities.	√	√	√	√	Strategy
			Establish a continuous communication channel among the Developer / Owner, Contractor and the surrounding residents and building users.	√	√	√	√	

			Contractor to designate a person to record and review the opinion, complains and advices provided by the surrounding residents and building users, and to coordinate with the project staff to improve the site activities.	√	√	√	√	

OPERATION STAGE

Categories		Sub-criteria	Indicators	N	R	
Indoor Environmental Quality (IE)						
IE1	Health & Hygiene	IE 1.1 Health & Hygiene	Good ventilation in common corridors and lift lobbies	√	√	Strategy
			No narrow and deep re-entrant in high rise residential block		√	
			Formulation of building hygiene management plan	√	√	
			Carry out inspection of hygienic conditions and cleansing of common parts of buildings regularly	√	√	
			Space provision in core and shell area to provide cleansing facilities and store cleansing equipment	√	√	
			Maintain water trapping of floor drain	√	√	
			Operate and maintain a good cooling tower, hot water system and associated water treatment system with efficient operation and minimisation of health risk	√		
			Sufficient air relief / transfer air is provided in lavatories and bathrooms when mechanical air extraction is used	√	√	
			Innovative method to enhance the health and hygiene of the building	√	√	
IE2	IAQ	IE 2.1 IAQ Certification	Building achieved a certain class of the relevant criteria in EPD IAQ Certification Scheme and with the conditions of fresh air intake locations	√	√	Performance
		IE 2.2 Thermal Comfort	Provide and maintain good thermal comfort in occupied space using predicted mean vote	√	√	Performance
		IE 2.3 IAQ Strategies	Survey of baseline outdoor air quality of the site to compare the findings with the EPD outdoor air quality objectives	√	√	Strategy
			Provide with sufficient fresh air in HVAC system	√		
			Provide with good natural ventilation in habitable rooms and kitchens		√	
			Provide with effective ventilation system in car parks and semi-confined public transport Interchanges	√		
			Dedicated exhaust air duct provided to serve smoking area/ entire building employed non – smoking policy	√		
			Dedicated exhaust air duct provided to serve landlord / tenant copy / printing areas, and other pollutant generating areas	√		
			Provide well-maintained commercial kitchen ventilation system with effective oily fume and odour removal in restaurants and food business	√		
			Use of low emission materials in building construction	√	√	

Categories		Sub-criteria	Indicators	N	R	
IE3	Noise and Acoustic Environment		Carry out regular visual inspection and test on the cleanliness of MVAC installations	√		
			Implement and review IAQ management plan	√		
			Innovative method to further improve IAQ during building operating period	√	√	
		IE 3.1 Noise and Acoustic Environment	Actual room criteria fulfils the recommended value without implication of background noise level	√	√	Strategy
			Indoor environment provided with good acoustic quality	√	√	
			Indoor environment provided with good vibration isolation	√	√	
			Appropriate acoustic environment for the intended purposes	√	√	
			Provision of sufficient noise insulation	√	√	
			Innovative method to further improve the indoor noise and acoustic environment	√	√	
IE4	Lighting Environment	IE 4.1 Daylighting (Performance for Residential and Strategy for Non-residential)	VDF of habitable rooms and kitchens		√	Strategy / Performance
			Appropriate room depth	√		
			Sufficient Vertical Daylight Factor (not less than 30%)	√		
			Provide with view	√		
		IE 4.2 Visual Quality & Comfort	Daylight comfort and quality	√		Strategy
			Artificial lighting comfort and quality	√		
			Lighting for energy conservation	√	√	
			Innovative method to further improve visual comfort and lighting energy efficiency	√	√	
Building Amenities (BA)						
BA1	Safety	BA 1.1 Safety Regulations	Provide a safe habitation and working environment for building occupants and users	√	√	Pre-requisite
		BA 1.2 Safety Management	Formulation of safety management and fire evacuation plan by building operator	√	√	Strategy
			Designated person to identify potential hazards and to implement safety measures regularly	√	√	
			Fire drill arranged for building users regularly	√	√	
BA2	Management	BA 2.1 Building Management	Property management company accredited with quality management system – ISO 9000 standard	√	√	Strategy
			Property management company accredited with environmental management system – ISO 14000 standard	√	√	
			Property management company accredited with occupational health and safety management system – OHSAS 18001 standard	√	√	
			Periodic training to property management company staff	√	√	

Categories		Sub-criteria	Indicators	N	R	
			User and environmental manual / guideline to tenants and building occupants	√	√	Strategy
			Technical training from Contractors and/or Designers in building handover period provided for property management company	√	√	
			Occupant feedback records & regular management review	√	√	
			Keeping of full set building records	√	√	
			Annual review of insurance coverage	√	√	
			Innovative method to further improve the effectiveness of future buildings management by building operator	√	√	
BA3	Controllability	BA 3.1 Building Controllability	Capability for partial operation of building facilities & systems	√	√	Strategy
			Capability for control over major environmental systems by building users	√		
			Comprehensive automatic monitoring system serving major electrical and mechanical installations provided	√	√	
			Comprehensive automatic control system serving major electrical and mechanical installations provided	√	√	
			Comprehensive automatic control & monitoring system serving major lighting installations provided	√	√	
BA4	Maintainability	BA 4.1 Essential maintenance	Ensure regular and effective maintenance is providing for essential building services installations	√	√	Pre-requisite
		BA 4.2 Regular Inspection	Appropriate building inspection conducted by property management company	√	√	Strategy
			Regular inspection on means of escape and fire resisting construction conducted by property management company	√	√	
			Regular inspection of building fabric, structure and facade	√	√	
			Regular inspection of slope, retaining wall and private roads	√	√	
		BA 4.3 Regular maintenance	Convenient and safe access provided for inspection, cleaning and maintenance of spaces throughout building	√	√	Strategy
			Convenient and safe access provided for inspection, cleaning and maintenance of all building facilities, building envelope and slope	√	√	
			Regular inspection and performance testing of building services installations	√	√	
			Preventive & corrective maintenance plan for building and services provided by property management company	√	√	
BA5	Living Quality	BA 5.1 Liveability	Balconies provided in residential flats		√	Strategy
			Provided with above minimum spatial or environmental provisions, such as common corridor and ventilated lift lobbies		√	
			Provided with communal gardens, such as podium and roof gardens, for use by the building occupants and users	√	√	
			Provided with other innovative green features to improve living quality provided	√	√	

Categories		Sub-criteria	Indicators	N	R	
Resources Use (RE)						
RE1	Energy Consumption	RE 1.1 Energy Consumption	Achieve higher levels of building energy performance and reduce annual energy consumption above the recognised local standards Reduce environmental impacts associated with excessive energy use in the whole life of building	√	√	Performance
RE2	Energy Efficiency	RE 2.1 Energy Efficiency (Building)	Built form and building orientation is designed to enhance energy conservation	√	√	Strategy
			Fixed horizontal/vertical external shading device provided	√	√	
			Movable external shading device for major atrium facade window or skylight is provided	√	√	
			Innovative fixed type or automatic internal shading device provided to reduce solar heat gain to the occupied area	√	√	
		RE 2.2 Energy Efficiency (Systems)	Use of evaporative cooling towers or other means of water-cooled heat rejection methods as the major heat rejection equipment for the building	√	√	Strategy
			Use of energy recovery system	√	√	
			Use of variable speed drive for fans in appropriate systems if operating energy saving can be achieved	√	√	
			Use of variable speed drive for pumps in appropriate systems if operating energy saving can be achieved	√	√	
			Use of electronic ballasts for all fluorescent lamps	√	√	
			Other innovative / effective energy efficient system provided	√	√	
		RE 2.3 Energy Efficiency (Electrical Appliances)	Use energy efficient appliances and equipment that helps reducing daily energy consumption.	√	√	Performance
		RE 2.4 Energy Efficiency (Energy Monitoring)	Energy meter(s) for central chiller plant, boiler plant and heat rejection plant and associated water-side system provided	√		Strategy
			Energy meter(s) for air-side equipment and/or a cluster of split-type air-conditioning units serving landlord / public area in floor / zone basis provided	√	√	
			Energy meter(s) for electric lighting system serving landlord / public area in floor / zone basis provided	√	√	
		RE 2.5 Energy Audit	Forming of energy audit team / employ external energy audit team to carry out walk-through audit for the whole building not less than once for 3 years	√	√	Strategy
			Building operator to collect annual historical energy data and to determine the Energy Utilisation Index	√	√	
			To implement any previously identified Category 2 EMO	√	√	
			To implement any previously identified Category 3 EMO	√	√	
RE3	Use of Renewable Energy	RE 3.1 Renewable Energy Applications	Use renewable energy technology to reduce environmental impacts associated with fossil fuel energy use	√	√	Performance

Categories		Sub-criteria	Indicators	N	R	
RE4	Water Conservation	RE 4.1 Greywater Recycling	Recycle and reuse greywater in order to reduce the consumption of fresh and flushing water	√	√	Performance
		RE 4.2 Rainwater Recycling	Consider the percentage of total amount of rainwater being recycled for reuse and relevant facilities provided	√	√	Performance
		RE 4.3 Water Conservation Strategies	Use of low flow / automatic / semi - automatic (cistern type) water closet	√	√	Strategy
			Use of automatic / manual flow control faucet	√		
			Use of automatic / manual flow control valve for urinal	√		
			Use of water saving irrigation system	√	√	
			Use of other water saving device or innovative idea on management to reduce water consumption	√	√	
RE5	Timber Use	RE 5.1 Sustainable Timber Use	Use timber from sustainable source and percentage of timber use from qualified sustainable source in the past 3 years	√	√	Performance
RE6	Material Use	RE 6.1 Recycled Material Use	Reduce material consumption and reduce demands on limited reserves of natural resources by using recycled materials	√	√	Performance
		RE 6.2 Environmentally-Friendly Materials	Use environmentally-friendly building materials to reduce environmental impacts	√	√	Performance
Loadings (LD)						
LD 1	Pollution	Minimise outdoor pollution and the subsequent health and environmental impacts under global and local considerations		√	√	Pre-requisite
		LD 1.1 Air Pollution	All thermal insulations used for building fabric are CFC/HCFC free	√	√	Strategy
			All thermal insulations used for water pipes and air ducts are CFC/HCFC free	√	√	
			All refrigerants used are zero ozone depleting potential	√	√	
			No toilet exhaust outlet located facing any kitchen / living room / bedroom openings directly in 5 metres at open space or within a light well		√	

Categories		Sub-criteria	Indicators	N	R	
			No refuse storage room opening located facing any kitchen / living room / bedroom openings directly in 5 metres at open space or within a light well		√	
			Innovative method to reduce air pollution substantially due to building operation	√	√	
		LD 1.2 Water pollution	Cleansing of fresh water tank at least once every 3 months	√	√	Strategy
			Cleansing of flushing water tank and other water storage tanks at least once every 6 months	√	√	
			Effective water filtration system for swimming pool provided	√	√	
			Effective water filtration system fountain and landscape pool provided	√	√	
LD2	Waste Management	Reduce waste generation, disposal and the associated environmental impacts		√	√	Pre-requisite
		LD 2.1 Waste Management	Building operator established and implemented municipal waste management strategy	√	√	Performance
			Designated centralised space and facilities provided for sorting and storage of recyclable and non-recyclable waste	√	√	
			Designated space(s) and facilities provided on each floor for sorting and storage of recyclable and non-recyclable waste	√	√	
			Automatic sorting and storage facility provided for recyclable and non-recyclable materials in each building / whole site	√	√	
			Provision of self-closing air tight system provided to store organic waste that may lead to bad smell and hygienic problem	√	√	
			Designated person to inspect the operational effectiveness on waste management strategies every week	√	√	
			Innovative method to reduce waste generation or effective waste management due to building operation	√	√	
Site Amenities (SA)						
SA1	Inclusion	SA 1.1 Social Interaction	Open /covered / enclosed common space with facilities provided to harmonise the space use by all building occupants and users for their interactions and communications	√	√	Strategy
			Enhanced barrier free access and facilities for convenient provided for disabled and elderly persons	√	√	
			Innovative method to further enhance the effectiveness of social interaction in existing building	√	√	
		SA 1.2 Connectivity	Common space with covered and comfortable pedestrian connections to open space, entrance and building facilities provided within the site	√	√	Strategy
			Large communal leisure and recreational facilities are directly accessible within 15 minutes walk via safe pedestrian path directly	√	√	
SA2	Landscape	SA 2.1 Landscape	Provided with communal landscape areas on ground level	√	√	Strategy
			Landscape for slope and retaining wall within the site provided	√	√	
			Biotope with native species provided within the site	√	√	
			Innovative measures provided to achieve better landscaped environment	√	√	

Categories		Sub-criteria	Indicators	N	R	
SA3	Cultural Character	SA 3.1 Culture Character	The building having a distinctive cultural character	√	√	Performance
SA4	Security	SA 4.1 Security	Space with minimal risk for building occupants and users	√	√	Strategy
			Effective passive security facilities provided	√	√	
			Effective active security measures provided	√	√	
			Carry out other innovation measures to enhance security	√	√	
Neighbourhood Amenities (NA)						
NA1	Provisions for Community	NA 1.1 Provisions for Community	Facilities provided within the site or having similar provisions in the immediate neighbouring sites to support communal and social services	√	√	Strategy
			Facilities provided within the site to or having similar provisions in the immediate neighbouring sites to provide convenient services to community	√	√	
			Other innovation measure provided to enhance provisions for community	√	√	
NA2	Transportation	NA 2.1 Public Transportation	Building designed to encourage the use of public transportation instead of private car	√	√	Performance
		NA 2.2 Green Transport	Covered bicycle parking area is provided within the site if public bicycle path is available nearby the site	√	√	Strategy
			Vehicle access of the building cause minimal traffic impacts to the surrounding	√	√	
			Elevated / safe pedestrian path to the nearby public transport facilities provided	√	√	
			Provision for future car pool facilities for building occupants / without vehicle parking area in the building	√	√	
			Other innovative method provided to further reduce environmental impact due to transportation and to enhance convenient transportation services	√	√	
Site Impacts (SI)						
SI1	Site Environment	SI 1.1 Healthy Environment	Provided with optimum daylight access to buildings within the site and the view to surroundings	√	√	Strategy
			Provided with effective natural ventilation and wind permeability within the site	√	√	
			Provided with effective noise mitigation measure within the site	√	√	
			Provided with optimum sunlight penetration within the site	√	√	
			Provided with other innovative building arrangements to enhance the overall building environmental quality in and around the site	√	√	

Categories		Sub-criteria	Indicators	N	R	
Neighbourhood Impacts (NI)						
NI1	Environmental Interactions	NI 2.1 Environmental Interactions	To conduct periodic check for any designed daylight and natural ventilation enhancement feature has been degraded and causing impact to the surroundings	√	√	Strategy
			To conduct periodic check for any designed outdoor air quality impact minimization feature has been degraded and causing impact to the surroundings	√	√	
			To conduct periodic check for any designed noise and visual impact minimization feature has been degraded and causing impact to the surroundings	√	√	

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Hong Kong institute of Housing	Mr Kelvin Yau
Hong Kong Institute of Planners	Mr Derek Sun
Hong Kong Housing Department, HKSAR Government	Mr Chan Wai Lam, Mr Ken Cheung Kun Sing
Hong Kong Housing Society	Mr Augustine Chow
Institution of Mechanical Engineers, Hong Kong Branch	Dr Stephen Lee
Kowloon-Canton Railway Corporation	Mr Alan Lo
Lands Department, HKSAR Government	Mr Lai Yuen Ping
Mass Transit Railway Corporation Ltd	Mr Terence Chan
Professional Green Building Council	Mr Tom Ip
Planning Department, HKSAR Government	Mr Rupert Y Lo
Civil Engineering and Development Department (Former Territory Development Department), HKSAR Government	Mr H W Tin
The Association of Architectural Practices	Ms Carolin Fong
The Conservancy Association	Ms Lister Cheung
The Great Eagle Development & Project Management Ltd	Mr Tong Chun Wan
The Hong Kong E&M Contractors' Association Ltd / The Hong Kong Federation of Electrical & Mechanical Contractors Ltd	Mr Martin King
The Hong Kong Institute of Real Estate Administration	Mr Albert So
The Lift & Escalator Contractors Association	Mr Johnny Au
The Real Estate Developers Association of Hong Kong	Mr Michael Arnold
Urban Renewal Authority	Mr Daniel Ho
九龍社團聯會社會事務政策組	Mr Chiu Kwok Wai

LIST OF WRITTEN COMMENTS

Written submissions received after the Wider Consultation Forum on 20 April 2005

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Drainage Services Department, HKSAR Government
Electrical & Mechanical Services Department, HKSAR Government
Environmental Protection Department, HKSAR Government
Henderson Real Estate Agency Limited (Mr C K Lau)
HK-BEAM Society
Hong Kong Construction Association
Hong Kong General Chamber of Commerce
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Professional Green Building Council
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The Hongkong Electric Co. Ltd.
The Hong Kong Federation of Electrical and Mechanical Contractors Limited
The Hong Kong Institution of Engineers
The Real Estate Developers Association of Hong Kong