BPD_GM02

ES Submission at As-Built Stage for Residential Buildings

These ES submission forms are to be generated from the ES Online Portal (*previously known as Green Mark (GM) E-filing Portal).* These generated submission forms are to be e-signed by the QP and appropriate practitioners before submitting via CORENET.

Sample Forms Attached for Viewing Only

Applicable for Projects with 1st Submission date for URA planning Permission on or after 1 Dec 2021

The forms spell out all the base and carbon reduction measures requirements which QPs and the other practitioners can choose for their design to meet the minimum environmental sustainability standards in complying with the Building Control (Environmental Sustainability) Regulations 2008.

QPs are only required to provide salient information pertaining to the items that are relevant to their design and the ES Online Portal (previously known as Green Mark (GM) E-filing Portal) will which compute and perform validation on those items that are required to be complied/selected.

In addition:
If there is any deviation to the last submitted template/form, please update and re-submit the template/form on building envelope (e.g. RETV), and daylight (where applicable)

Submittal of the other documents may be required and shall be made in such manner and in such form as the Commissioner of Building Control requires upon request

For more information: https://www1.bca.gov.sg/buildsg/sustainability/minimum-environmental-sustainability-standard-for-new-buildings-and-existing-buildings-undergoing-major-additions-and-alterations.

Building and Construction Authority

SUBMISSION OF ENVIRONMENTAL SUSTAINBILITY REQUIREMENTS
Regulation 7 of the Building Control (Environmental Sustainability) Regulations 2008 (Cap. 29)

Commissioner of Building Control Building & Construction Authority 52 Jurong Gateway Road, #11-01 Singapore 608550	*INSTRUCTIONS* (1) Please refer to the Explanatory Notes attached before completing these forms via ES Online Portal. (2) Submit one copy of this form together with Form BPD_GM02_Appendix 1 (for residential building) and/or Form BPD_GM02_Appendix 2 (for non-residential building) with the application for approval of building plans.

Section I (To be completed by Qualified Person)

1. I confirm that I have been appointed under section 8(1)(a) or 11(1)(d)(i) of the Building Control Act (Cap 29) as the qualified person in respect of the building works herein described.

   Project Reference No.: _____ GM e-Filing No.: _____

   Description of building works: _____

2. I hereby declare that the building works or parts thereof assessed are in compliance with the minimum environmental sustainability standard that have met the score of minimum 50 points using the methodology specified in the Code for Environmental Sustainability of Buildings and are as stated in Form BPD_GM02_Appendix 1 and/or Form BPD_GM02_Appendix 2 where relevant.

Name & Address of Professional Firm	Name & Signature of Qualified Person
Date:	Tel No.:

Section II (To be completed by Appropriate Practitioners)

3. We hereby declare that the building works or parts thereof assessed are in compliance with the minimum environmental sustainability standard using the methodology specified in the Code for Environmental Sustainability of Buildings.

Name & Address of Professional Firm	Name & Signature of Practitioner for Mechanical Works
Date:	Tel No.:
Name & Address of Professional Firm	Name & Signature of Practitioner for Electrical Works
Date:	Tel No.:

Appendix 1

ENVIRONMENTAL SUSTAINBILITY REQUIREMENTS FOR RESIDENTIAL BUILDINGS
Regulation 7 of the Building Control (Environmental Sustainability) Regulations 2008 (Cap. 29)

SECTION I: SUMMARY

Project Reference No.: _____ GM e-Filing No.: _____

The Gross Floor Area (GFA) for the building works, where applicable:

Building Works	New GFA in m^2	Existing GFA in m^2 (Major Retrofitting)
Residential		Not Applicable
Non-Residential		
Total		

(I) Base Requirements	**Applicable** (Yes/No)	**Compliance** (Yes/No)
RB01 Envelope and Roof Thermal Transfer		
RB01-1 Building Envelope		
RB01-2 Roof		
RB02 Building Energy Performance		
RB02-1 Air-Conditioning System		
RB02-2 Lighting System for Common Facilities and Areas		
RB02-3 Mechanical Ventilation System for Carpark Areas		
RB02-4 Vertical Transportation System		

Total no. of compliances: _____ No. of sustainable attributes that are not applicable: _____
(Total No of compliances + No. of sustainable attributes that are not applicable = 6)

Sustainable attributes that are not applicable due to the following reasons:

Appendix 1

Project Reference No.: _____ GM e-Filing No.: _____	
(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]	**Selected Options** (√ complied)
Part 1: Sustainable Design Strategies	
RBE01-1 Tropical Building Envelope Performance	
(a) Façade design with RETV of not more than 20 W/m^2	
(b) Cool materials that are certified – Minimum coverage of 80% of external walls or roof areas	
(c) Innovative façade technology and solutions for 20% of fenestration areas	
RBE01-2 Naturally Ventilated Building Design	
(a) Building layout design - Minimum 30% of dwelling units with window openings facing prevailing wind directions	
(b) Dwelling unit design - Minimum 25% of living rooms and bedrooms with effective cross ventilation	
(c) Natural ventilated design for common areas - Minimum coverage of 80% in at least two (2) common areas	
RBE01-3 Effective Daylighting	
(a) For units - Minimum 25% of total number of dwelling units in 60% of applicable areas	
(b) For common areas - Minimum coverage of 80% (by number) in at least two (2) common areas	
Part 2: Sustainable Construction	
RBE02-1 Resource Efficiency Measures	
(a) Existing building structures areas are conserved for adaptive reuse – More than 50% of the floors and/or wall areas	
(b) Concrete Usage Index of no more than 0.50	
(c) Embodied carbon reporting for upfront carbon emission of concrete, steel and glass	
RBE02-2 Low carbon concrete	
(a) Eco-friendly cement for 80% of superstructural works	
(b) Aggregate replacement that meet minimum usage requirement	
(c) Alternative construction materials as replacement for standard building materials for non-structural application	
RBE02-3 Sustainable Products	
Provision of at least three (3) environmentally friendly products that are certified for 80% of applicable areas or building components	
Part 3: Sustainable Technologies	
RBE03-1 Renewable Energy System	
Minimum capacity installation of 15% roof coverage of residential building blocks within the development	
RBE03-2 Smart Technology Solutions	
Provision of smart solutions and technologies which help facilitate resource usage monitoring and reduce overall energy consumption	
• Energy dashboard, web-based or mobile application or equivalent to provide useful and timely information on utilities consumption and breakdown for homeowners and/or facility manager	
• Energy recovery system	
• Lifts with regenerative function	
• Occupancy sensors /controls for lighting in private lift lobbies, staircases or common areas	
• Others, pls state _____ (subject to BCA's clearance)	

Total No. of Carbon Reduction Measures: _____ No. of Proposed Alternative Solutions: _____

SECTION II: SUPPLEMENTARY DETAILS

Project Reference No.: _____ GM e-Filing No.: _____

(I) Base Requirements

RB01 Envelope and Roof Thermal Transfer	**Applicability**

RB01-1 Building Envelope

(a) The building envelope designed meet the Residential Envelope Transmittance Value (RETV) of no more than 22 W/m^2 based on the methodology stated in the Code on Envelope Thermal Performance for Buildings and the details are as follows:

Block No/Ref	Gross areas of external wall and windows (m^2)	Gross Heat Gain (W)	RETV, W/m^2 of the respective block

RETV (Weightage Average) for the whole development is _____W/m^2

OR

(b) The building envelope is to be designed with the following design parameters with the respective glazing properties

Window to Wall Ratio (WWR)	Shading Coefficients of Glass (SC_{glass}) criteria
< 0.30	≤ 0.67
0.30 to < 0.35	≤ 0.59
0.35 to < 0.40	≤ 0.52
0.40 to < 0.45	≤ 0.48
0.45 to ≤ 0.50	≤ 0.43

$WWR_{bldg\ devt}$ = _____

Proposed SC_{glass} range from _____ to _____

☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

Not Applicable reason:
- *No Provision*

RB01-2 Roof

Roof Weight Group	**Weight Range (kg/m^2)**	**Maximum U- value (W/m^{2}k)**	**U-Value of Roof (W/ m^2/K)**
Light	<50	0.8	
Medium	50 to 230	1.1	
Heavy	>230	1.5	

☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

Not Applicable reason:
- *No Provision*

SECTION II: SUPPLEMENTARY DETAILS

Project Reference No.: _____ GM e-Filing No.: _____

(I) Base Requirements

RB02 Building Energy Performance	**Applicability**

RB02-1 Air-conditioning System

Provision of air-conditioning system that meet the following design system efficiency.

Design System Efficiency (DSE)	
Single/ Multiple Split System	5 ticks rated
Variable Refrigerant Flow (VRF) system	3 ticks rated

Total numbers of dwelling units: _____

Total numbers of common facilities: _____

Type of Air-conditioning System used	Total number of air conditioning units in all dwelling units	Total number of air conditioning units in all common facilities
Single /Multi Spilt system with minimum 5 ticks rating		
VRF system with minimum 3 ticks rating or equivalent		
Total air conditioner units that meet the minimum design system efficiency		
Percentage (%) of air-conditioners that meet the requirements		

Other type of cooling system used	DSE, kW/RT	Estimated cooling load, RT
Other systems, such as Centralised Cooling System, minimum system efficiency of 0.67kW/RT		

☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

Not Applicable reason:

- *Air-conditioning system is not provided*

RB02-2 Lighting System for Common Facilities and Areas

Lighting system provision of at least 40% more energy efficient than the prescribed lighting power budget stated in SS530 for common facilities.

The percentage improvement in lighting power budget = _____ %

Note: Lighting provision for building façade and landscape should comply with the prescribed lighting power budget stated in SS 530, where relevant.

☐ *Yes* ☐ *Complied*
☐ *Not Applicable*

Please select one of the following reasons if this section is not applicable in this development:

Not Applicable reason:

- Lighting system is not provided

SECTION II: SUPPLEMENTARY DETAILS		
Project Reference No.: _____		GM e-Filing No.: _____
(I) Base Requirements		
RB02-3	**Mechanical Ventilation System for Carpark Areas**	
Use of CO detection sensor control with Variable Speed Drive (VSD) on mechanical ventilation in carpark areas.		☐ *Yes* ☐ *Complied* ☐ *Not Applicable* Please select one of the following reasons if this section is not applicable in this development: **Not Applicable** reason: o *Carpark is naturally ventilated* o *Carpark not built for this project*
RB02-4	**Vertical Transportation System**	
Use of lifts with AC variable voltage and variable frequency (VVVF) motor drive or equivalent and energy efficient features such as sleep mode features		☐ *Yes* ☐ *Complied* ☐ *Not Applicable* Please select one of the following reasons if this section is not applicable in this development: **Not Applicable** reason: o *Lift system not provided* o *Lift system serves less than 4 floors* o *The use of traction lifts is not suitable for this project*

Project Reference No.: _____ GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]

Part 1: Sustainable Design Strategies

RBE01-1 **Tropical Building Envelope Performance**

(a) The building envelope is designed with Residential Envelope Transmittance Value (RETV) of no more than 20 W/m2 based on the methodology stated in the Code on Envelope Thermal Performance for Buildings

RETV = _____ W/m^2

☐ *Selected Option*
☐ *Complied*

(b) Application of cool materials that are certified by an approved local certification body for 80% of all external wall of residential block or roof areas

☐ *Selected Option*
☐ *Complied*

Block Description	Total areas (m2)	Total Non-Applicable Areas (m2)	Total Applicable Areas (m2)	Total Areas with cool materials (m2)	Extent of Coverage in %
External Wall Areas					
Residential Blocks					
OR					
Roof Areas					
Residential Blocks					
Carpark					
Common Facilities and others					

Note : Non-applicable areas can include green roofs, walls and areas beneath large equipment such as water tanks or photovoltaic (PV) panels where the application of cool materials may not be relevant.

(c) Provision of innovative fenestration technology or solutions such as the use of electrochromic glass, integration of photovoltaic modules, parametric façade and so on for at least 20% of the fenestration areas

☐ *Selected Option*
☐ *Complied*

Total fenestration areas (in m^2) = _____

Technology or solution used	Façade Area, in m^2
Electrochromic glass	
Integration of photovoltaic modules	
Parametric facade	
Others (pls state) _____ *(Subject to BCA's clearance)*	
Total fenestration areas with innovative solutions	
Percentage % of fenestration area that meet the requirements	

Project Reference No.: _____ GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]

RBE01-2 **Naturally Ventilated Building Design**

Air flow design in the development

a) Building Layout design

Total nos. of units in the development	Nos of units with window openings facing prevailing wind directions	
	No. of units	% distribution

☐ *Selected Option*
☐ *Complied*

(b) Dwelling Unit design

Total nos. of units in the development	Units designed with effective inlet and outlet openings to facilitate good cross ventilation		
	No. of living rooms	No. of bedrooms	% distribution

☐ *Selected Option*
☐ *Complied*

(c) Common Areas
Minimum two (2) common areas designed with at least 80% natural ventilation

☐ *Selected Option*
☐ *Complied*

Toilet rooms /bathrooms of dwelling units ☐

Lift Lobbies and Corridors ☐

Staircases ☐

Carpark ☐

Common facilities ☐

RBE01-3 **Effective Daylighting**

Daylighting design in the development

☐ *Selected Option*
☐ *Complied*

a) Habitable Spaces: Dwelling unit design
Daylighting provision for 25% of the total number of residential units that meets the desired lighting level of $DA_{200lx,\ 50\%}$ in 60% of applicable areas (namely bedrooms, living room, family room and study room) based on daylight availability matrix provided

Total nos. of units in the development	
Nos of units meets the desired lighting level	

Project Reference No.: _____	GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]

b) Non- Habitable Spaces: Common Areas Minimum two (2) common areas with at least 80% with provision of daylighting to comply to this measures Toilet rooms /bathrooms of dwelling units ☐ Lift Lobbies and Corridors ☐ Staircases ☐ Carpark ☐ Common facilities ☐	☐ *Selected Option* ☐ *Complied*

Project Reference No.: _____ GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]

Part 2: Sustainable Construction

RBE02-1 **Resource Efficiency Measures**

Design and practices that optimises resource efficiency in building construction

(a) Existing structures with more than _____of floor and / or wall areas are conserved and/or adapted for reuse

☐ *Selected Option*
☐ *Complied*

(b) Design with Concrete Usage Index (CUI) of not more than 0.50

Concrete Volume in m^3 (A)	
Total Constructed Floor Area in m^2 (B)	
Project Concrete Usage Index (CUI), C = A/B	

☐ *Selected Option*
☐ *Complied*

(c) Embodied carbon reporting

Submission of report on upfront carbon emissions of three key construction materials namely, concrete, steel and glass used in the building development.

☐ *Selected Option*
☐ *Complied*

RBE02-2 **Low Carbon Concrete**

Use of sustainable materials for construction

(a) Eco-friendly cement used:

☐ Use of concrete (up to grade C50/60) with clinker content of less than 400 kg/m2 for 80% of superstructure works

or

☐ SGBC– certified concrete for 80% of the super-structural works

☐ *Selected Option*
☐ *Complied*

(b) Aggregate replacement: Use of recycled concrete aggregate (RCA) and/or washed copper slag (WCS) from approved sources that meet the minimum usage requirement (that is 1.5% x GFA for RCA and/or 0.75 x GFA for WCS)

☐ *Selected Option*
☐ *Complied*

GFA = _____ m^2

	Minimum usage requirement (tons) based on GFA	Tonnage used	Meet Minimum Usage (Yes/No)
RCA used			
WCS used			
Granite fines used			

Project Reference No.: _____ GM e-Filing No.: _____	
(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]	
Part 2: Sustainable Construction	
(c) Alternative construction materials that can be used as a replacement for standard building materials for non-structural application Materials used: _____ Area of Application: ☐ Footpath ☐ Road Construction ☐ Concrete bench for parks ☐ Pavement ☐ Others (please specify): _____	☐ *Selected Option* ☐ *Complied*
RBE02-3	**Sustainable Products**
Minimum provision of three (3) environmentally friendly products that are certified with Environmental Product Declaration (EPD) requirements or two-ticks rating by an approved local certification body for 80% of the applicable areas or building components in relation to dwelling units (minimum 3 product categories for 80% of applicable areas or building components in relation to dwelling units)	☐ *Selected Option* ☐ *Complied*

Project Reference No.: _____ GM e-Filing No.: _____

(II) Carbon Reduction Measures [Select four (4) carbon reduction measures from 3 Parts including a minimum of 2 measures from Part 2- Sustainable Construction]

Part 3: Sustainable Technologies

RBE03-1	**Renewable Energy System**

Encourage the use of on-site renewable energy systems renewable energy system with minimum capacity installation of 15% roof coverage of residential building blocks within the development.

A suitable monitoring and recording of energy generated from the system used to be incorporated.

Nos of residential blocks, (a)	
Total Roof Area (b)	
Minimum coverage with PV system (c)	
Total area coverage of Photovoltaic (PV) System installed (d)	
Total PV System installed	

☐ *Selected Option*
☐ *Complied*

RBE03-2	**Smart Technology Solution**

Provision of smart solutions and technologies which help facilitate resource usage monitoring and reduce overall energy consumption.

- ☐ Energy dashboard, web-based or mobile application or equivalent to provide useful and timely information on utility consumption and breakdown for homeowners and/or facility manager
- ☐ Energy recovery system
- ☐ Lifts with regenerative function
- ☐ Occupancy sensors/controls for lighting in private lift lobbies, staircases or common facilities
- ☐ Others (to be evaluated on a case-to-case basis)

☐ *Selected Option*
☐ *Complied*

Appendix 1

Project Reference No.: _____ GM e-Filing No.: _____

SECTION III: ADDITIONAL INFORMATION

(I) Summary of Sustainable Products used in RB02-3

List of Sustainable Products

S/No.	Description of environmentally friendly products	Certification Type (EPD/SGBC 2 Ticks)	Applicable areas or building Components	Extent of Coverage (%)
1				
2				
3				
4				
5				

(minimum 3 product categories for 80% of applicable areas or building components)