

<b>Form GMIS-1: Submission Form for Energy Modeling For Green Mark Incentive Scheme (Finalisation of Building Design)</b>	
Research & Innovation Department Building & Construction Authority 5 Maxwell Road #16-00 Tower Block, MND Complex Singapore 069110	<b>INSTRUCTIONS:</b> (1) Please refer to the Explanatory Notes attached before completing the form. (2) Use a separate set of forms for each building. (3) *Delete accordingly
Project Ref. No.: _____  Description of Building / Building Works: _____ _____ _____ _____  *Lot / Plot _____ *TS / MK _____  Address / Road : _____ _____	
(1) As the Qualified Persons responsible for the design of M&E services for the above mentioned project, we declare that: <ul style="list-style-type: none"> <li>a. the energy modeling conducted for the project is in accordance with the requirements of BCA's Framework for Energy Modeling for Green Mark Incentive Scheme and</li> <li>b. based on the results of the energy modeling, the Proposed Model is expected to achieve a saving of _____% in annual energy consumption compared to the Reference Model.</li> </ul>	
(2) We attach the following documentations to support the above declaration: <ul style="list-style-type: none"> <li>a. Summary of Space and ETTV of the Building Envelope (Form GMIS-1.1)</li> <li>b. Comparison of Reference Model versus Proposed Model (Form GMIS-1.2)</li> <li>c. Summary of Energy by End Use including Efficiency Indicators for both models (Form GMIS-1.3)</li> <li>d. Summary printouts of energy modeling software</li> </ul>	
Name, Address, Email and Tel of M&E Consultancy Firm for the project	(1) Name & Signature of Qualified Person (Mechanical PE)          (2) Name & Signature of Qualified Person (Electrical PE)

### FORM GMIS-1.1: Summary of Space and ETTV of the Building Envelope

<b>(A) Space Summary</b>			
Building Use	Air-Conditioned Area (m <sup>2</sup> )	Non Air-Conditioned Area (m <sup>2</sup> )	Total Area (m <sup>2</sup> )
1. Office			
2. Toilets			
3. Storage			
4. Corridor			
5. Atrium			
6. Foodcourt			
7. Mechanical / Electrical			
8. Staircase			
9. Conference			
10. Retail Outlets			
11. Carpark			
12. Others			
<b>Total</b>			

**Note: The building use floor areas for both the Reference and Proposed Models must be the same.**

<b>(B) Building Envelope Summary - ETTV</b>			
Orientation of Façade	Gross Area of External Walls (m <sup>2</sup> )	Reference Model ETTV (W/m <sup>2</sup> )	Proposed Model ETTV (W/m <sup>2</sup> )
North			
North-East			
East			
South-East			
South			
South-West			
West			
North-West			
<b>Average ETTV of the Building Envelope (W/m<sup>2</sup>)</b>		50 W/m <sup>2</sup>	

**FORM GMIS-1.2: Comparison of Reference Model versus Proposed Model**

<b>BUILDING ELEMENT</b>	<b>REFERENCE MODEL</b>	<b>PROPOSED MODEL</b>
<b>BUILDING ENVELOPE</b>		
Wall Construction		
Opaque Doors		
Windows		
Floor		
Roof		
Window to Wall Ratio (WWR)		
Others		
<b>ELECTRICAL SYSTEMS</b>		
Lighting Power Density (W/m <sup>2</sup> )		
Lighting Occupant Sensor Controls		
Lighting Daylighting Controls		
Receptacle Power (W/m <sup>2</sup> )		
Lifts & Escalators		
Others		
<b>Note: The Receptacle Loads for both the Reference and Proposed Models must be the same.</b>		

BUILDING ELEMENT	REFERENCE MODEL	PROPOSED MODEL
<b>RENEWABLE ENERGY SYSTEMS</b>		
Photovoltaics		
<b>Note: Always include a description of renewable energy systems used to reduce Proposed Model energy consumption.</b>		
<b>SCHEDULES</b>		
Occupancy, Lighting & Equipment		
HVAC		
<b>Note: The Occupancy Rates and Operating Schedules for both the Reference and Proposed Models must be the same.</b>		
<b>MECHANICAL &amp; PLUMBING SYSTEMS</b>		
HVAC System Type		
AHU Fan Properties		
Boiler Efficiency		
Central Plant Efficiency		
<b>Note: Central plant efficiencies and capacities for chillers and cooling towers should be listed whenever the central plant is included as part of the energy model.</b>		
HVAC Circulation Loop Properties		
Domestic Water System		
Mechanical Ventilation Fans		
<b>OTHERS</b>		

Description of differences between the Reference Model and Proposed Model not documented on other forms:

Not Applicable

Attached

**FORM GMIS-1.3: Summary of Energy by End Use including Efficiency Indicators for both models**

End Use	Reference Model Energy Consumption (kWh)	Proposed Model Energy Consumption (kWh)	Energy Consumption Savings (%)
Lighting – (Air-Conditioned Space)			
Lighting- (Non Air-Conditioned Space)			
<sup>1</sup> Air-Conditioned Plant			
<sup>2</sup> Air System Fans			
Mechanical Ventilation Fans			
Lifts			
Escalators			
Receptacle Equipment			
Domestic Water Systems			
Others			
<b>Total Building Energy Consumption</b>			

**Renewable Energy Sources**

End Use	Energy Produced (kWh)	Reference Model Energy Consumption (kWh)	Proposed Model Energy Consumption (kWh)	Energy Consumption Savings (%)
Photovoltaics				
Others				
<b>Total Building Energy Consumption including Renewable Energy Sources</b>				

**Efficiency Indicators**

Efficiency Indicators	Reference Model	Proposed Model
Energy Efficiency Index, EEI (kWh/m <sup>2</sup> /yr)		
System Efficiency of Air-Conditioned Plant (kW/kW)		

<sup>1</sup> Chilled Water System (chillers, water pumps and cooling towers)

<sup>2</sup> Chilled water Air Handling and Fan Coil units

**EXPLANATORY NOTES FOR APPENDIX C – SUBMISSION FORM FOR ENERGY MODELING FOR GREEN MARK INCENTIVE SCHEME**

To facilitate verification of the declared energy consumption, the submission forms shall be accompanied by the following:-

- (a) The detailed computation of the ETTV values for both the Reference and Proposed Model using APPENDICES 1 to 4 of “ETTV CALCULATION FORMAT IN RESPECT OF AN AIRCONDITIONED BUILDING”.
- (b) Certification of the simulation program is tested in accordance to the ASHRAE Standard 140.
- (c) The input data of the simulation program for both the Proposed and Reference Models shall include:
  - 1. Space input data for all zones comprising detail information on construction materials and their properties designed for each individual zone. For example, room area, walls, windows, doors, floors, partitions, sensible and latent loads (lightings, occupancy rates, receptacles loads, Outdoor ventilation rates, misc. loads etc).
  - 2. Schedules for each individual operating zone (eg. lighting, occupants, mechanical fans, AHUs, other mechanical and electrical equipment, etc.)

**Note:**

- 1. The developer shall furnish a softcopy of the executable input data file(s) used in the generation of the energy estimates for the Proposed and Reference models.
  - 2. The developer shall produce detailed shop drawings and other necessary information which is necessary for the comprehensive evaluation of the energy modeling before awarding the Green Mark Incentive Scheme, as and when requested by BCA.
- (d) The output data of the simulation program for both the Proposed and Reference Models shall include:
    - 1. Monthly energy consumption by Mechanical and Electrical system components (eg. Air-Conditioned Systems, Lighting Systems, Receptacle Equipment, Lifts, Escalators, etc).
  - (e) The FORM GMIS-1 shall be signed by the Qualified Persons (both Mechanical and Electrical Professional Engineers) for the project.