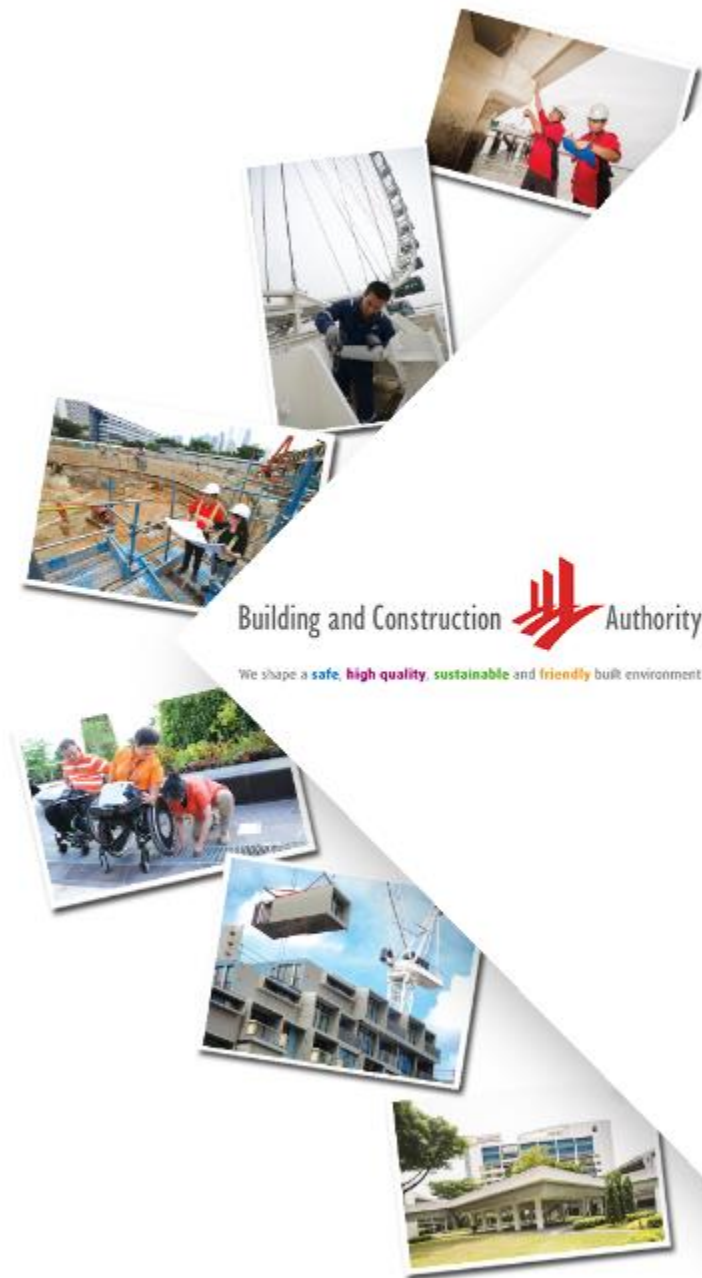


User Manual of IEE Calculator - Assessment

ES/BERII





Building and Construction Authority
We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

Objective of document

- The document serves as the user manual for the Intelligent Energy Efficiency calculation tool, used for GM/SLE project EE assessment process

To ensure the results are close to the energy modelling results, user need to use the declaration form to pre-calculate the inputs for the AI EE Calculator.

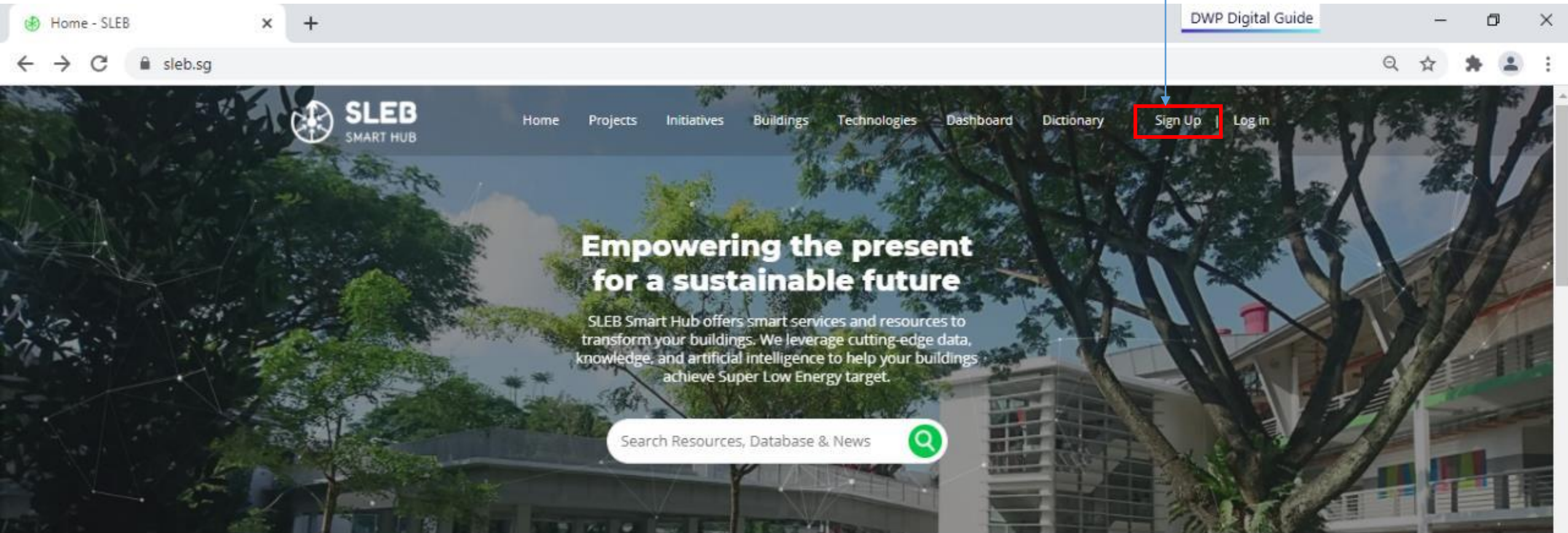
Processes

Pre-assessment	Assessment	Post assessment
<p>GM project team evaluate the <u>suitability</u> of using AI EE Calculator based on:</p> <ul style="list-style-type: none">• Building types*• Building size \leq 40,000 sqm• Not special or complex building such as Jewel Changi Airport <p><i>*Currently, the AI calculator work best for Office, Retail, Hotel, Educational Institution, Healthcare Facility, Mixed Development and Industrial Buildings</i></p>	<p>GM project team use Declaration Form (template provided below) to pre-calculate the inputs for AI EE Calculator for better accuracy compared to energy modelling</p> <p> Microsoft Excel Worksheet</p> <p>GM project team use AI EE Calculator to generate Assessment Report and fine tune the design parameters if needed</p>	<p>GM project team inform BCA the decision about which EE pathway to be certified.</p> <p>GM project team submit Final Report (template provided below) together with Declaration Form with GM project owner's sign-off</p> <p> Adobe Acrobat Document</p>

Create a user account

First time user need to visit www.sleb.sg to sign up a user account

Click the “Sign Up” and follow the steps to register the user account



Create new project

1. Click the “Sleb App” under “Building” and click the “Assessment Module” thereafter

2. Click here to start a new project

The screenshot shows the SLEB Assessment Module web application. The browser address bar displays 'sleb.sg/SLEBApp/Assessment'. The navigation menu includes 'Home', 'Projects', 'Initiatives', 'Buildings', 'Technologies', 'Dashboard', 'Dictionary', and 'Admin'. A dropdown menu is open under 'Buildings', listing 'Smart Advisor', 'Building Directory', 'Green Mark Directory', and 'Sleb App'. The 'Sleb App' option is highlighted with a red box. A callout box points to this option with the instruction: '1. Click the “Sleb App” under “Building” and click the “Assessment Module” thereafter'. Below the navigation, the 'Assessment Projects' section is visible, with a sub-header 'Provide or amend as-designed parameters for assessment'. A large green icon with a plus sign and the text 'Start a new assessment project' is highlighted with a red box. A callout box points to this icon with the instruction: '2. Click here to start a new project'. Below this, there are three project cards: 'KG block IFS', 'Keppel Tower Redevelopment', and another 'KG block IFS' card. Each card displays an image, address, GFA, status, and last update date, along with 'Duplicate', 'Delete', and 'Share' icons.

Project Details

Select the project type, new development or major retrofitting project

Select the applicable version of GM standard, once standard is selected, the default baseline will be set.

Please select number of buildings in the project, if there are multiple buildings in the project, the details of each building need to be provided

If the “Mixed development” building type is selected, the details of each type of use need to be provided

1. Project Details

Project Name

Postal Code

Address

Gross Floor Area (m²)

Project Status

New Development

Retrofitting Project

Only common file formats (JPG, GIF, PNG) with a file size less than 2 MB will be accepted.



Upload Photo



2. Green Mark Application Details

Green Mark Version

Green Mark: 2021

Green Mark Reference Number

3. Building Details

Number of Buildings in Project

1

Building #1



Building Name

Gross Floor Area (m²)

Building Type

Office Building

Create New Project

Return to Dashboard

Important Notes

- Notes:

1. Please provide all the required information under the “reference model” and “proposed model” columns.
2. User may choose to edit some of the parameters under the “reference model” column based on the applied Green Mark version.
3. For mixed-use buildings, please provide inputs for each use type separately, or treat the use type as a separated building using the “Additional Building” button.

Building Details

If it is a mixed-development building, there is a dropdown list showing at the building name. The details (include the façade, air con, lighting, MV and other) of each use type need to provided.



ABCD [Edit](#)

BCA Academy

GFA: 10000 m²

Project Status:
New Development

Green Mark Version:
Green Mark: 2021

Green Mark Reference
Number:
GM 2345

[Generate Report](#)

[Return to Dashboard](#)

ZEB

Office Buildi...

[Add new building](#) [Duplicate building](#) [Delete building](#)

[Home](#) [Calendar](#) [Settings](#) [Lighting](#) [Energy](#) [Help](#)

Building Name	<u>ZEB</u>
Address	<u>If different from project address</u>
Postal Code	<u>If different from project postal code</u>
Gross Floor Area (m ²)	<u>10000</u>
Number of Storeys	<u>10</u>
Year of TOP/CSC	<u>2000</u>
Building Type	<u>Mixed Development</u>

Details of Mixed-Use Development Use Type

Building Use Type	<u>Office Building</u>
Operation Schedule of Specified Building Use (hr/week)	<u>55</u>
Storeys Occupied in Building	<u>6</u> to <u>10</u>
Floor Area (m ²)	<u>5000</u>

[Save](#) [Next](#)

Façade

Assessment Module

ZEB
Office Buildi...

Add new building Duplicate building Delete building

Home Building HVAC Lighting Sustainability +

	Reference Model	Proposed Model
Envelope Thermal Transfer Value (W/m ²)	45	35
Percentage of Naturally Ventilated Area Converted From AC Area (%)	0	20

Save Next

Generate Report

Return to Dashboard

ABCD Edit
BCA Academy
GFA: 10000 m²
Project Status: New Development
Green Mark Version: Green Mark: 2021
Green Mark Reference Number: GM 2345

Provide the inputs for façade system. Please note that the ETTV needs to be pre-calculated if the design details are available

A/C and A/D

User may provide the as-design A/C and A/D system efficiency, or click “Calculator” to estimated based on the specification data of products such as chiller, pump, cooling tower and fan efficiency

The button to go back to the default value for reference model

Please use the **declaration form** to pre-calculate the average fresh air intake rate if the design details are available

If there is the secondary air con system in the building, click this button to add details

The screenshot shows a software interface for configuring air conditioning and distribution systems. The interface is divided into a sidebar on the left and a main configuration area on the right.

Sidebar:

- Project Name: ABCD
- Project Type: BCA Academy
- GFA: 10000 m²
- Project Status: New Development
- Green Mark Version: Green Mark 2021
- Green Mark Reference Number: GM 2345
- Buttons: Generate Report, Return to Dashboard

Main Configuration Area:

	Reference Model	Proposed Model
Air Conditioning System Type	Water-cooled Chill...	Water-cooled Chill...
Percentage of Air-Conditioned Area (%)	80	80
Air-Conditioning System Efficiency (kW/RT)	Default	0.5
		<input type="checkbox"/> Calculator
Air Conditioning System Optimisation	<input type="radio"/> Yes	<input checked="" type="radio"/> Yes
	<input checked="" type="radio"/> No	<input type="radio"/> No
Air Distribution System Type	<input checked="" type="radio"/> AHU-VAV	<input checked="" type="radio"/> AHU-VAV
	<input type="radio"/> AHU-CAV	<input type="radio"/> AHU-CAV
	<input type="radio"/> FCU-CAV	<input type="radio"/> FCU-VAV
		<input type="radio"/> FCU-CAV
Average Air Distribution System Fan Power	<input checked="" type="radio"/> ≥4 kW	<input checked="" type="radio"/> ≥4 kW
	<input type="radio"/> <4 kW	<input type="radio"/> <4 kW
Air Distribution System Efficiency (kW/RT)	Default	0.2
		<input type="checkbox"/> Calculator
Percentage of Cooled Area Applying Demand Control (%)		10
Fresh Air Intake Rate (L/s/m ²)	2	2

Buttons at the bottom: Additional ACMV System, Save, Next

Lighting

Assessment Module

ZEB
Office Buildi...

Home | Grid | Settings | **Lighting** | Fans | Comments

Reference Model	Proposed Model
Lighting Power Density (W/m ²) 15	5
Percentage of Lighted Area Applying Demand Control (%) 0	50

Save Next

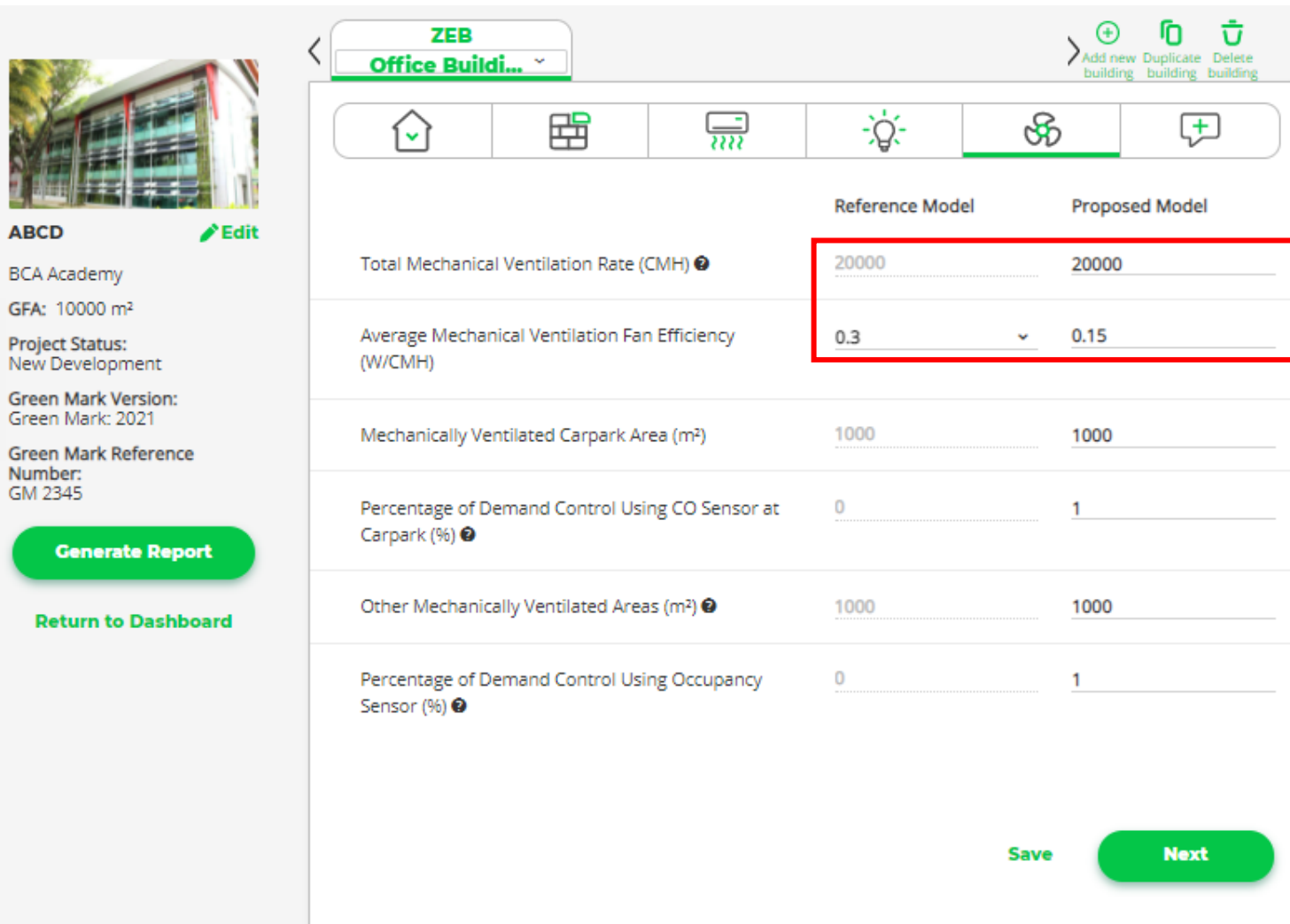
Generate Report

Return to Dashboard

BCA Academy
GFA: 10000 m²
Project Status: New Development
Green Mark Version: Green Mark: 2021
Green Mark Reference Number: GM 2345

Provide the inputs for LPD, or use the **declaration form** to pre-calculate the inputs for LPD of the reference model and proposed model

MV and carpark



ZEB
Office Buildi...

Add new building Duplicate building Delete building

Home Settings HVAC Lighting **MEV** Comments

	Reference Model	Proposed Model
Total Mechanical Ventilation Rate (CMH) ⓘ	20000	20000
Average Mechanical Ventilation Fan Efficiency (W/CMH)	0.3	0.15
Mechanically Ventilated Carpark Area (m²)	1000	1000
Percentage of Demand Control Using CO Sensor at Carpark (%) ⓘ	0	1
Other Mechanically Ventilated Areas (m²) ⓘ	1000	1000
Percentage of Demand Control Using Occupancy Sensor (%) ⓘ	0	1

Save Next

Provide the inputs for MV rate and average efficiency, or use the **declaration form** to pre-calculate the inputs for the reference model and proposed model

Others and Renewables

ZEB Office Building

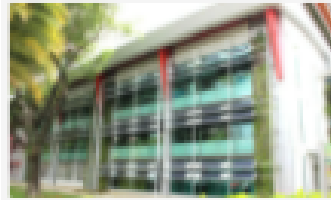
Reference Model Proposed Model

Receptacle Load Density (W/m ²)	5	5
Lift Total Rated Power (kW)	10	10
Lift With Regenerative Features	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Escalator Total Rated Power (kW)	10	10
Escalator With Sleep Mode Features	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Other Systems Energy Consumption (kWh/year)	1000	10000
Energy Consumption Monitoring and Benchmarking System	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Renewable Energy Capacity (kWp)	0	10

Save Generate Report

Provide the inputs for average RLD, or use the **declaration form** to pre-calculate the inputs for the reference model and proposed model

Report Page



ABCD

BCA Academy

GFA: 10000 m²

Project Status:
New Development

Green Mark Version:
Green Mark: 2021

Green Mark Reference
Number:
GM 2345

EUI results under **Pathway 1**

Energy Savings results under
Pathway 3

[Return to Dashboard](#)

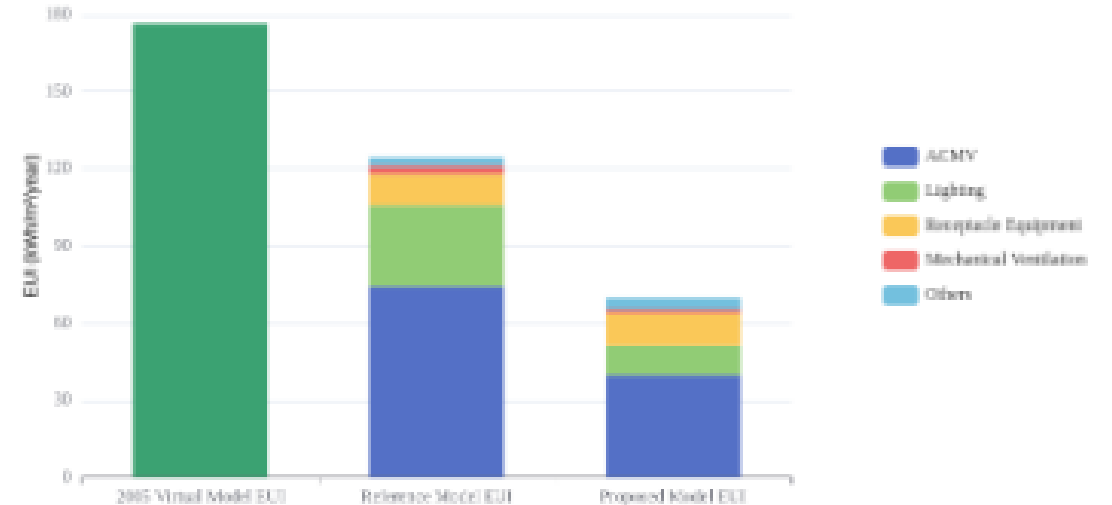
Summary:

The proposed model achieves net EUI of 62.1 kWh/m²/year. It saves 50.0% energy compared to Green Mark: 2021 standard, and saves 64.8% energy consumption compared to the 2005 code compliant building. Hence, the energy efficiency of the building has meet Green Mark SLEB requirement.

Energy Consumption, EUI and Energy Savings

	2005 Code Compliant Building	Reference Model	Proposed Model
Total Energy Consumption (kWh/year)	1765000	1242270	698031
EUI (kWh/m ² /year)	176.5	124.2	69.8
Percentage of Energy Savings	60.5%	43.8%	-
Renewable Energy Generated or Used (kWh/year)	-	-	76650
Nett Energy Consumption (kWh/year)	1765000	1242270	621381
Nett EUI (kWh/m ² /year)	176.5	124.2	62.1
Percentage of Energy Savings Including Renewable Energy	64.8%	50.0%	-

EUI Benchmark



Report Page

Energy Consumption Breakdown

	Reference Model Energy Consumption (kWh)	Proposed Model Energy Consumption (kWh)	Energy Savings
ACMV	744190	396866	46.7%
Lighting	313300	117325	62.6%
Mechanical Ventilation	29640	14820	50.0%
Receptacle Load*	123500	123500	0.0%
Others	31640	45521	-43.9%
Total Building Energy Consumption	1242270	698031	43.8%

*capped at 25% of total energy consumption for reference model

Key metrics under **Pathway 2**

Performance Metrics Under Pathway 2

	Proposed Model
ETTV	35
Non-AC Areas	20.0%
ACMV TSE (kW/RT)	0.824
Air Side Efficiency (kW/RT) (DCS)	-
ACMV (Unitary)	-
Lighting Power Budget (W/m ²)	5
Mechanical Ventilation (W/CMH)	0.15
Integrated Energy Management & Control Systems	MOE Energy Management System, Energy Consumption Monitoring and Benchmarking System, Lighting Demand Control, ACMV Demand Control
On-Site Renewable (kWh/year)	76650

Disclaimer

This Energy Efficiency Assessment Report ("Report") was generated from inputs provided by the user to predict target project's energy consumption. While the information in this Report is believed to be correct, neither the Building and Construction Authority (BCA), nor any of its employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favouring by BCA. The views and results of the Report expressed herein do not necessarily state or reflect those of BCA.

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