User Manual of
IEE Calculator - Assessment

ES/BERII
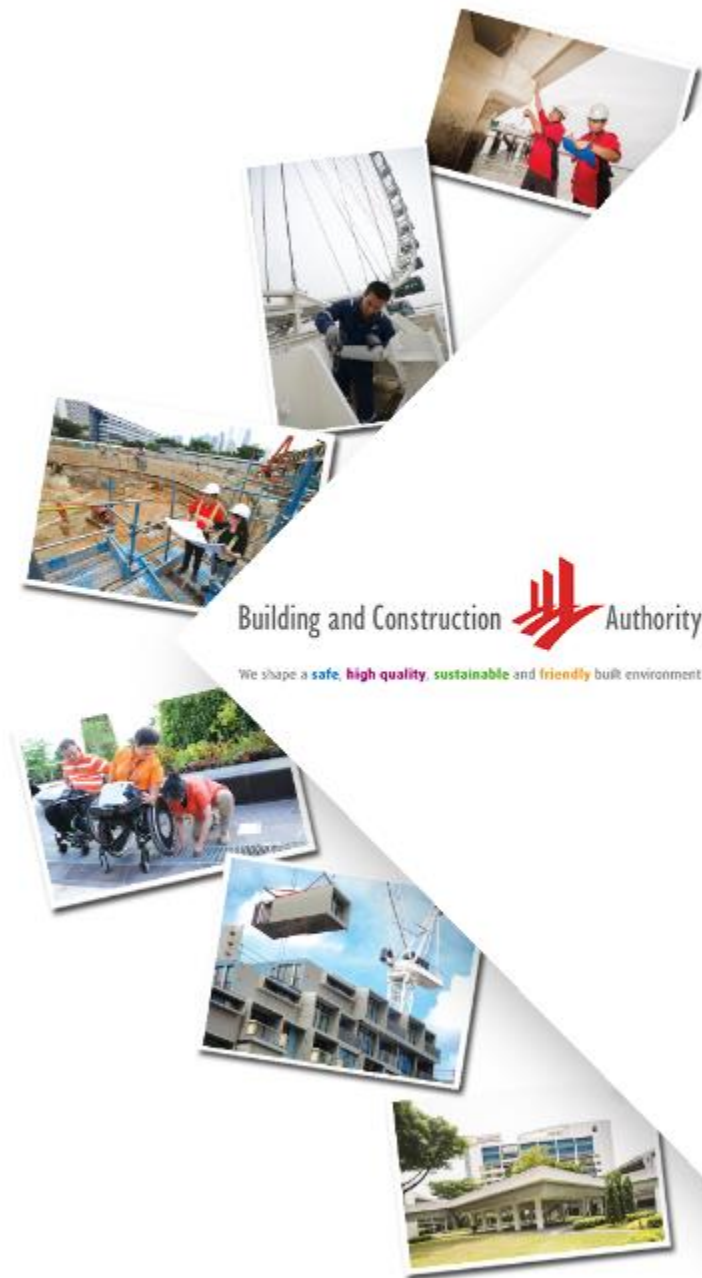
Objective of document

- 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.
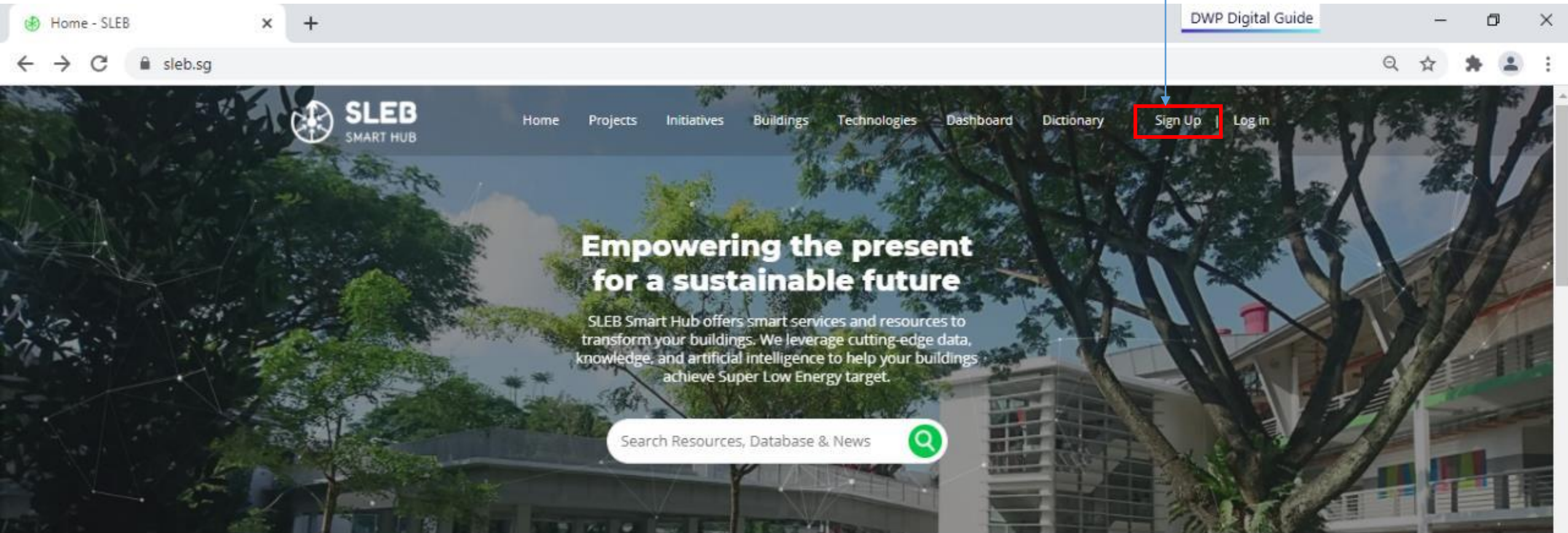
Processes

Pre-assessment	Assessment	Post assessment
GM project team evaluate the suitability of using AI EE Calculator based on: • Building types* • Building size ≤ 40,000 sqm • Not special or complex building such as Jewel Changi Airport *Currently, the AI calculator work best for Office, Retail, Hotel, Educational Institution, Healthcare Facility, Mixed Development and Industrial Buildings*	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 Microsoft Excel Worksheet GM project team use AI EE Calculator to generate Assessment Report and fine tune the design parameters if needed	GM project team inform BCA the decision about which EE pathway to be certified. GM project team submit Final Report (template provided below) together with Declaration Form with GM project owner's sign-off Adobe Acrobat Document

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

2. Click here to start a new project

5

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.

ZEB
Office Buildi... ⌄

Add new building   Duplicate building   Delete building

Building Name   ZEB

Address   If different from project address

Postal Code   If different from project postal code

Gross Floor Area (m²)   10000

Number of Storeys   10

Year of TOP/CSC   2000

Building Type   Mixed Development

Details of Mixed-Use Development Use Type

Building Use Type   Office Building

Operation Schedule of Specified Building Use (hr/week)   55

Storeys Occupied in Building   6   to   10

Floor Area (m²)   5000

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

Save   **Next**

Façade

Assessment Module

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

	Reference Model	Proposed Model
Envelope Thermal Transfer Value (W/m²) ❓	45	35
Percentage of Naturally Ventilated Area Converted From AC Area (%) ❓	0	20

Save   **Next**

Provide the inputs for façade system. Please note that the ETTV needs to 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

ZEB
Office Buildi... ▾

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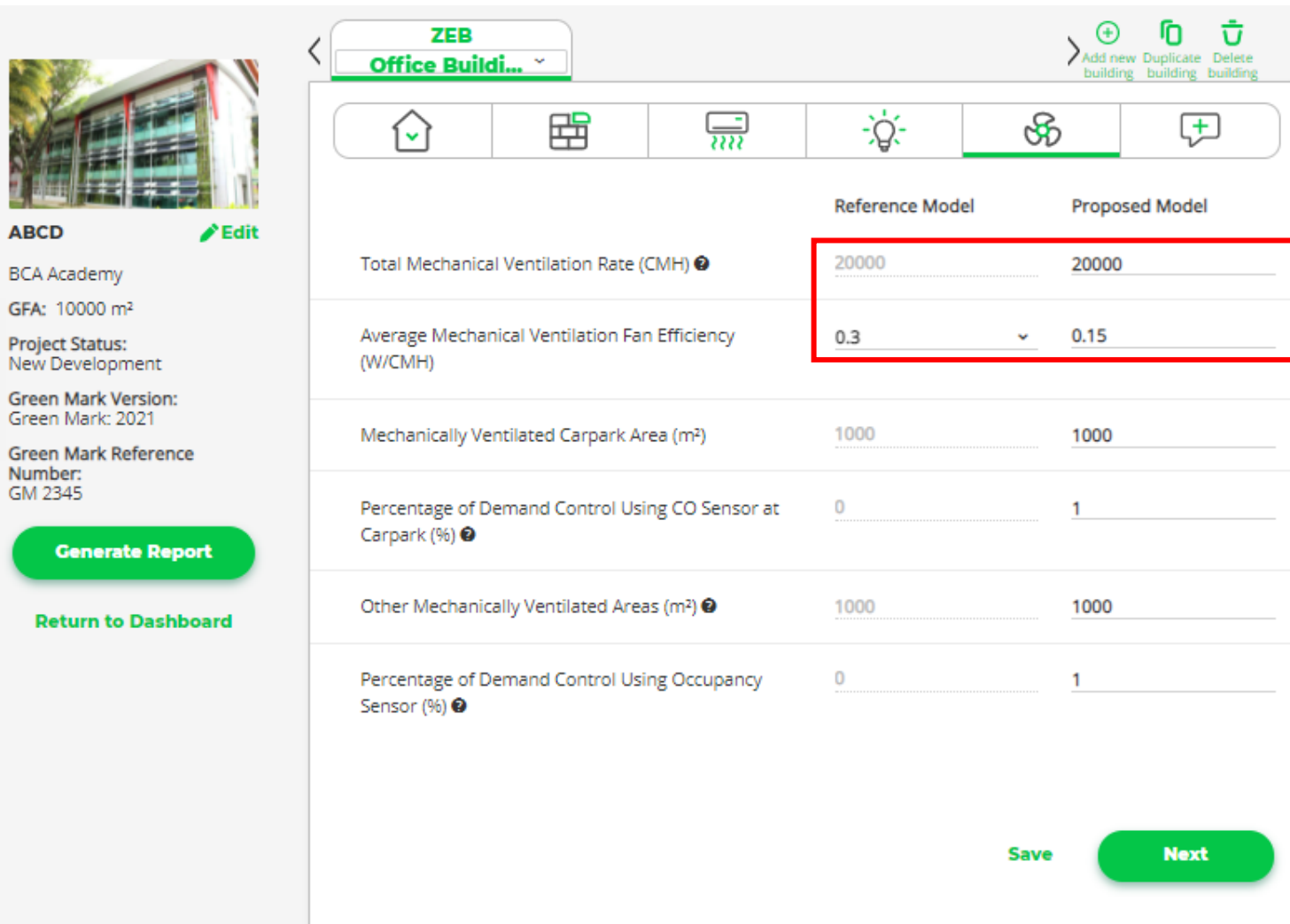BCA Academy
GFA: 10000 m²
Project Status:
New Development
Green Mark Version:
Green Mark: 2021
Green Mark Reference
Number:
GM 2345

Generate Report

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	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	0.6 □ Calculator
Air Conditioning System Optimisation	○ Yes ⦿ No	⦿ Yes ○ No
Air Distribution System Type	⦿ AHU-VAV ○ AHU-CAV ○ FCU-CAV	⦿ AHU-VAV ○ AHU-CAV ○ FCU-VAV ○ FCU-CAV
Average Air Distribution System Fan Power	⦿ ≥4 kW ○ <4 kW	⦿ ≥4 kW ○ <4 kW
Air Distribution System Efficiency (kW/RT)	Default	0.2 □ Calculator
Percentage of Cooled Area Applying Demand Control (%)		10
Fresh Air Intake Rate (L/s/m²)	2	2

Additional ACMV System   Save   **Next**

Lighting

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

	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

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
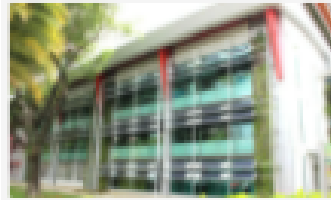
Others and Renewables

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

Return to Dashboard

EUI results under **Pathway 1**

Energy Savings results under **Pathway 3**

Summary:

The proposed model achieves nett 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/m²/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/m²/year)	176.5	124.2	62.1
Percentage of Energy Savings Including Renewable Energy	64.8%	50.0%	-

EUI Benchmark
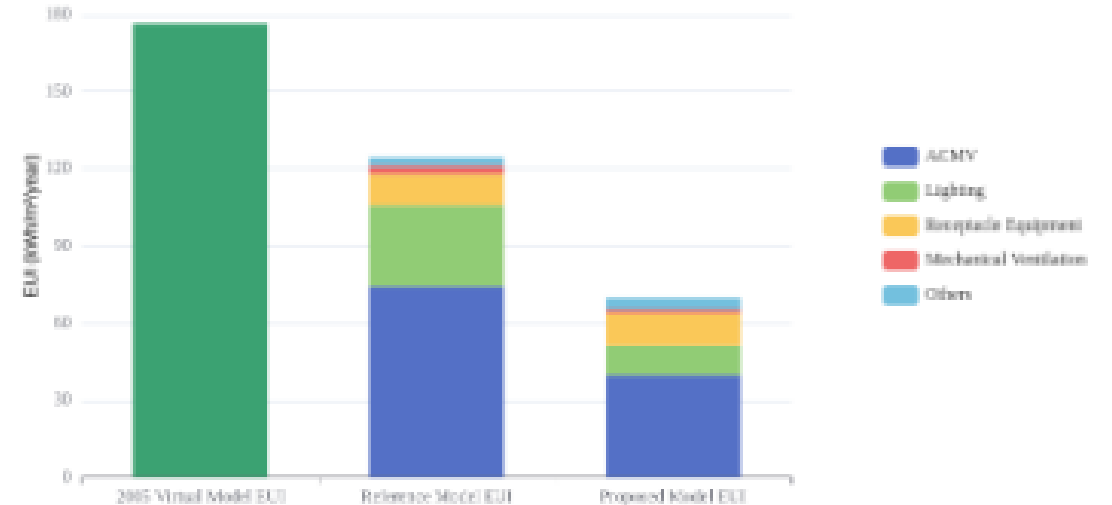
Report Page

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

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/m²)	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

Key metrics under **Pathway 2**

Return to change parameters or down load the report

Return To Project   **Download Report**