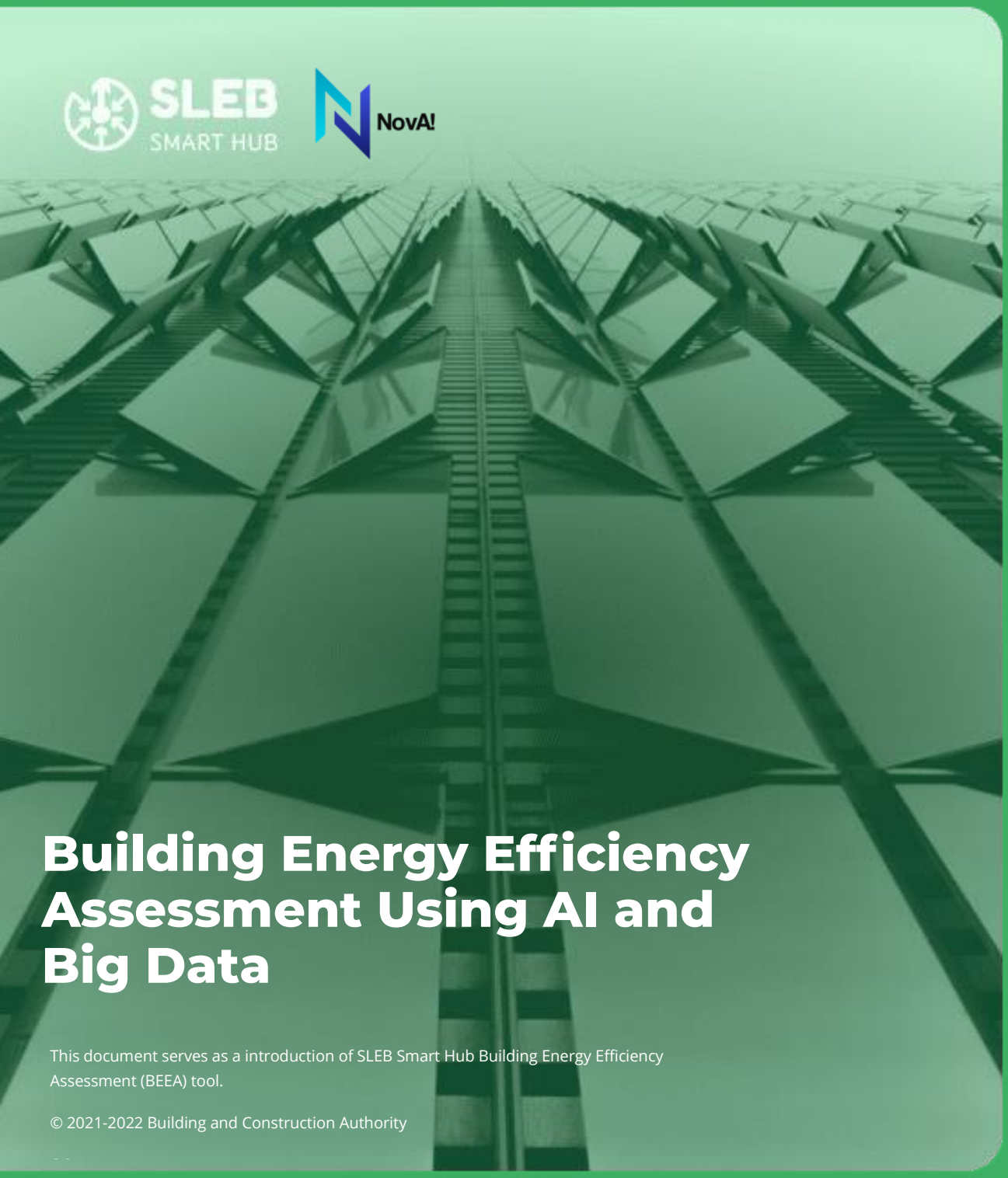

Building Energy Efficiency Assessment Using AI and Big Data

This document serves as a introduction of SLEB Smart Hub Building Energy Efficiency Assessment (BEEA) tool.

For any enquiry, please contact the SLEB Smart Hub system administrator at **admin@sleb.sg**.

History

Singapore Building and Construction Authority (BCA) developed BEEA (Building Energy Efficiency Assessment) in support of the Singapore Green Building Masterplan (SGBMP)[1]. Singapore National Research Foundation (NRF), a department within the Prime Minister's Office (PMO), funded the BEEA development under the Green Buildings Innovation Cluster (GBIC) programme.

What is BEEA?

BEEA (Building Energy Efficiency Assessment) is a quick online self-assessment tool to evaluate the energy efficiency level of build project.

By leveraging vast BCA database of green building projects, BEEA uses data-driven approach to analyse building's energy performance. With it AI-assisted energy modelling engine, BEEA calculates energy and carbon emission savings over the code compliant building[2] so as to determine the building energy efficiency level.

Consistent with BCA Green Mark 2021, BEEA can evaluate the building project for:

- New development
- Retrofitting
- In Operation

BEEA facilitates green financing by assessing building energy efficiency improvement compared to a base case. It makes it easier for people in the value chain to access financial support to shift to green development and green businesses.

By linking with SLEB Smart Hub Technology Directory[3], BEEA enables the discovery of green technologies at the early planning and design stage of green building projects.

BEEA can be used by building developers, building owners and SME business owners who are tenants of a building space. The building types of BEEA include Office, Retail, Hotel, Educational, Healthcare, Industrial, F&B, Supermarket, Residential and Others. BEEA can be used at any stage of the building life cycle including concept, design, new construction, existing buildings, and renovations.

Why Use BEEA?

Current industry practices rely on the physical model based simulation approach to evaluate building's energy performance. This approach is time-consuming and resource intensive and requiring energy modelling skills. Leveraging the AI/Machine Learning algorithms and building data collected by BCA, BEEA makes it easier and more convenient to evaluate building energy performance by providing an easy-to-use web-based user interface and generating instant

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[1] SGBMP is a collaborative effort involving industry stakeholders and the wider community to provide a healthy, liveable and sustainable Built Environment for all. For more information, please visit https://www1.bca.gov.sg/buildsg/sustainability/green-building-masterplans.

[2] Singapore Code for Environment Sustainability of Buildings https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/env_sus_code.pdf.

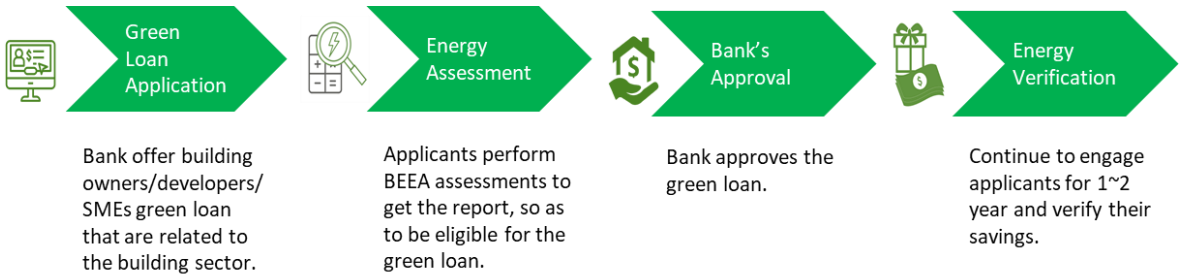
[3] SLEB Smart Hub Technology Directory is an online comprehensive database for green building technologies. Please visit https://sleb.sg/Technologies to view the technologies.

assessment results in a report. BEEA combines physics-based simulation with machine-learning based analytics engine to deliver fast and accurate building performance assessment. Because of its intelligent features, BEEA is a time-saving and cost-effective solution, which provides instant building assessment services with a low subscription cost.

BEEA Applications

- **Green Financing**

BEEA makes it easier for building owners, developers and small-to-medium enterprises (SMEs) to access green loans for buildings. Existing process for green loans requires the green building certifications to be obtained, a process which could take several weeks using consultant services depending on the scale and complexity of the project. With the functions provided by BEEA, building performance assessment can be done within minutes. This not only reduces processing time but also saves cost associated with the certification process. Therefore, it removes obstacles for people in the value chain, especially SMEs, to access green loan and hence getting support to shift towards green developments and green businesses.



- **GreenMark Pre-assessment**

GreenMark requires buildings to demonstrate operational energy reduction as compared with a baseline building (2005 Code complaint building). BEEA incorporated this function and is able to assess energy and emission reductions compared to the baseline building. For buildings that are planned to become GreenMark certified, proper design with sufficient energy efficient measures is essential to achieve the required amount of energy reduction. Therefore, at the early design stage of new constructions or at the planning stage of existing building retrofit, BEEA allows users to explore suitable energy efficient measures and perform pre-assessment to understand the building's performance compared to the baseline building and find ways to improve it.

How to Use BEEA?

BEEA is designed to be easy to use and allow for Do-it-Yourself technical analysis without the need for technical skills. Uses are only required to provide basic building characteristics data such as building type, floor area, and air-conditioning system type, along with energy efficiency measures that are implemented or to be implemented. Please refer to the "BEEA Quick Start Guide" for details how to use BEEA.