
**Methodology for achieving non-
residential zero-energy buildings
(ZEBs)**

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Foreword

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Introduction

This document aims to apply a methodology for achieving a zero-energy building (ZEB).

Since the Paris Agreement was adopted in the 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, all member countries (including emerging countries) have been required to set a target for reducing their greenhouse gas emissions by 2020 and later. In all countries, reducing energy consumption is the most effective means of mitigating greenhouse gas emissions.

The building sector takes a 30 % share of the world's energy consumption, and this contribution appears to be increasing^[8]. Therefore, reducing the greenhouse gas emissions from this sector is an important global issue. Ultimately, the energy consumption of the building must be reduced and balanced by renewable energy to create a (net) ZEB. Such advanced cases have already been constructed.

Although the ultimate goal of achieving ZEBs is clearly understood, its realization has been limited by practical barriers such as high initial investment. However, as the life cycle of buildings is long, the design and construction of more energy-efficient buildings is considered as a present attempt rather than a future one for greenhouse gas reduction. Hence, accelerating the movement toward ZEBs is an immediate urgency.

From this perspective, this document advocates a step-by-step realization approach for (net) ZEBs. Its aim is to accelerate the ZEB movement and describe the practical realization of ZEBs. Namely, this document proposes a practical ZEB approach and outlines the basic considerations during the complete process of ZEB realization, from design to the operation and maintenance stages.

To accelerate the reduction of greenhouse gases, this document aims to contribute policies and/or guidelines for disseminating ZEBs that suit the conditions of individual countries, especially those of emerging countries undergoing rapid urbanization.

To assist understanding of the contents of this document, the following four ZEB examples are included as annexes:

- (net) ZEB results of evaluating a ZEB renovation of an actual use office building (see Annex A);
- nearly ZEB results of evaluating a ZEB city hall encompassing regional history, climate, and resources^{1) 2)} (see Annex B);
- ZEB-ready model of an urban medium-sized office (see Annex C).

1) Net Zero Energy Buildings International Projects of Carbon Neutrality in Buildings (IEA SHC).

2) Three examples toward realizing ZEB were selected from the Net Zero Energy Building Advanced Case Collection published by The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan (SHASE). The (net) ZEB example is the Takenaka Corporation Higashi Kanto Branch Office. The nearly ZEB is Unnan City Hall. The ZEB ready example is the KT Building. The nearly ZEB example in Singapore non-residential building. Reference URL: http://www.shasej.org/recommendation/ZEB%20in%20Japan_2017_SHASE100th.pdf

