# Introduction
# Objectives and Composition of the Design Guidelines

## 1. Objectives of the Design Guidelines

Low energy housing with validated effectiveness (LEHVE) is housing that uses as much natural energy as possible under the given conditions such as site characteristics and family forms, and is able to reduce energy consumption ($CO_2$ emissions) during occupancy by half compared to housing that was common around 2000, while increasing liveability and convenience (See Chapter 1). Therefore, when designing LEHVE two types of technologies are required: one that makes the most of the potential of nature, such as solar energy and wind, and utilizes it; and the other in which equipment technology is carefully selected, designed and installed, as typified by cooling and heating systems and domestic hot water systems, from the perspective of energy performance.

This document provides practical technical information for designing LEHVE to professionals working at construction and architect offices who are directly engaged in making houses, i.e. general housing architects who are not specialized in environment and equipment planning. It also aims to propagate and promote LEHVE by having these architects utilize this document. For that purpose, this document covers versatile technologies which can be made practical as a priority and explains the method for designing and applying such technologies in a specific, easy and straightforward fashion. It also evaluates the energy saving effects and cost effectiveness achieved by using these technologies.

## 2. Technology Covered in the Design Guidelines

Methods for designing and applying individual technologies that are effective for designing LEHVE (hereinafter referred to as “elemental technologies”) are diverse and vary depending on design prerequisites such as regional and site conditions where the house is being built, the way the house is built and construction methods, and way of living.

In 2005, as the first step to propagate and promote LEHVE, we focused on elemental technologies related to detached wooden houses in relatively mild regions (Zone IV in the zone classification according to the energy conservation standard) and summarized them in the design guidelines. The present document targets the hot humid regions south of Zone V and discusses the elemental technologies related to houses designed under the following conditions.

- Construction region: Hot humid regions (Zones VI and V* in the zone classification according to the energy conservation standard)
- Housing construction: Detached house
- Construction methods: Reinforced concrete house for Zone VI
  Wooden house for Zone V (including traditional construction methods)

A diverse and wide range of elemental technologies are involved even under these specific conditions. However, in cases such as where site shapes and sizes as well as forms of the housing are unusual, it may be difficult to apply some elemental technologies, and if this is the case architects are required to exercise their own ingenuity for planning.

Moreover, some elemental technologies covered in this document are applicable to multi-family residential buildings or for house renovation.

* See“ Appendix 1: Zone Classification Data ” on p.384 for the zone classification based on the energy conservation standard. Zone VI belongs to Okinawa and Zone V extends to mainly South Kyushu and the Pacific coast west of Tokyo.

## 3. Composition of the Design Guidelines

This document is composed of the following six chapters:

Chapter 1 Low Energy Housing with Validated Effectiveness and Energy Conservation
It defines LEHVE and explains the significance of working on LEHVE as well as the indoor environment performance that LEHVE aims for.

Chapter 2 Design Process of Low Energy Housing with Validated Effectiveness and Outline of Elemental Technologies
From the perspective of both the natural energy application and energy-efficient equipment technology, it illustrates the design procedures for LEHVE and explains the overview of effective elemental technologies for designing. It also outlines the items to be considered that are peculiar to hot humid regions, such as heavy wind and rain as well as termites.

Chapter 3 Natural Energy Application Technology (Elemental Technology Application Method 1)
It covers elemental technologies that use natural energy such as wind, sunlight and solar heat as alternatives to fossil fuel energy, and explains their objectives, reduction targets of energy consumption, and specific design methods.

Chapter 4 Heat Control Technology of Building Envelopes (Elemental Technology Application Method 2)
It covers energy-efficient technologies using heat control measures for building envelopes including solar shading and thermal insulation and explains their objectives, reduction targets of energy consumption, and specific design methods. The details of these technologies differ between Zone VI and Zone V.

Chapter 5 Energy-efficient Equipment Technology (Elemental Technology Application Method 3)
It covers energy-efficient technologies related to the planning of the cooling and heating, ventilation and domestic hot water systems as well as selection of energy-efficient consumer electronics. It also explains their objectives, reduction targets of energy consumption, and specific design methods such as methods for selecting systems and devices.

Chapter 6 Energy Saving Effect Evaluation and its Utilization in Design
It summarizes the energy saving effects achieved by elemental technologies discussed in Chapters 3 to 5 and shows the evaluation results of energy consumption, $CO_2$ emissions and costs (initial and running). It also shows simplified estimation methods for energy-saving effects and introduces calculation examples of energy-efficient design using these methods.