

# ECO-HOUSING DESIGN

(美) 特伦斯·格林 / 编 | 杨子玉、常文心 / 译

## 节能住宅



辽宁科学技术出版社



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Green, environment-friendly, eco-housing, energy saving, sustainable... the new life style expressed by these words is much of a fad, latest fashion, a trend promoted and advocated by people. In fact, people have been talking about sustainable building methods since the 1970s, it was only in the recent years when internationally recognized ecofriendly house certification systems started to function properly.

The first such system was introduced in Great Britain in 1990 - BREEAM or the Building Research Establishment's Environmental Assessment Method. It gained international recognition almost instantly due to the stern assessment criteria and the rather transparent evaluation method.

Although the BREEAM is an internationally recognized system, many European countries developed their own local variations based on the BREEAM standards. In nowadays, EcoHome and LEED are also widely used and gained international recognition. More and more countries' governments, organizations and companies are working on their own fields to promote, study and research eco-housing and energy saving, providing references and standards for eco-and-energy-saving design.

Increase of population and social, economic development result in climate change, which is the biggest threat we face globally. The designer of residential building is responsible for joining in the trend of sustainable design for eco-and-energy-saving houses. Eco-housing involves the followings:

绿色、环保、生态、节能、可持续……这些词汇代表的新的生活方式日益成为人们推崇和提倡的潮流，俨然已成为一种时尚。其实，早在20世纪70年代人们就已经开始讨论可持续性建筑方法，直到近些年国际公认的环保生态建筑认证体系发挥了恰当的作用，生态节能建筑才真正流行起来。

1999年，英国-BREEAM体系或称建筑研究所环境评估法成为最早被引用的生态节能建筑评估体系。因其严苛的评估标准和透明的评估方法而迅速获得国际认可。

虽然BREEAM是一个国际认可的评估体系，许多欧洲国家在BREEAM标准的基础上进行局部改动，制定了符合各自国情的评估标准。目前国际上公认的评估体系还有EcoHome和LEED认证体系。越来越多的国家、机构、企业分别在各自所能及的范围内提倡、研究、甚至以法规手段强制推行生态节能的可持续理念、提供生态节能设计建议及参考标准。

人口增长和社会、经济的发展导致气候问题成为全球最具威胁性的问题。住宅建筑的设计和建造者们有责任参与到生态节能的可持续性设计中来。生态节能住宅设计涉及以下内容：

- \* To fit the new project into the environment by enhancing the natural landscape, not spoiling it.
- \* Landscaping, to adjust measures to local conditions and choose most suitable solution to maintain existing bio-environment, even enhancing the environment through design.
- \* To enhance living space quality through available technology, technique, products and design methods to create a comfortable and environment-friendly house with efficient energy saving.

Someone has said that in case a house is energy-saving prior, it must be at the cost of living and aesthetics comfort. I think now he can rest assured that, as more and more manufacturers and suppliers are being devoted to providing a wide range of energy saving products, building materials, decoration materials for architects and interior designers. Here, we select some excellent residential buildings, include house and apartment, which concentrate living and visual comfort, energy saving and environment protection, completed by architects from several countries for you. On the road back to natural and sustainable development, we will walk forward smoothly.

- 建筑融入周围环境，了解新建筑如何通过自然景观美化提升周围环境，而不是破坏环境
- 景观美化，因地制宜，选择最适宜的方式维持原有的生态环境，甚至提升生态环境
- 提升居住空间质量，通过各种可用的技术手段、产品和设计方法打造一个宜居、舒适又节能环保的生活空间

有人曾说，住宅一旦以节能环保为先，那一定是以牺牲人的居住舒适度和美观为代价的。我想，现在他大可以放心了，因为越来越多的产品生产企业投入更多的精力为我们的建筑设计者们提供了丰富的节能环保产品、建筑材料和装饰材料。在此，我们为大家精选了由多个国家建筑设计师打造的、集舒适、美观和节能环保于一身的优秀住宅建筑设计作品，包括独立住宅和公寓式住宅。在回归自然、可持续发展的道路上，我们的行走将会越来越顺畅、稳健。



# Introduction of Eco-or-environmental Housing

## 关于生态节能住宅

### 1. What is Eco-housing?

No precise definition of eco-housing is available. An attempt to define its boundaries at this point of time might risk the premature delivery of an evolving concept. Eco-housing enthusiasts use it to refer to an all-encompassing concept of sustainability of the built environment, achieved through different methods. The most common definitions talk of a comfortable and healthy habitat, achieved by low impact methods, consuming less resource than a standard habitat and using environmental friendly materials and products. Another definition considers eco-housing as a biomimicry by the built environment, imitating the self sustaining and cyclic processes in an ecosystem.

While eco-housing affirms that the basic purpose of buildings is to ensure human comfort, health and survival at an affordable cost, it reminds us that this is best achieved by being in harmony with the ecosystem and the socio-economic system. The use of resources for ensuring human comfort and survival would be done efficiently and effectively, without crossing any thresholds. Similarly the use of nature as a waste sink would be done prudently, without crossing any limits. The usual linear process of extraction-use-disposal would be converted to a self sustaining cyclic process.

The definition, criteria and priorities will vary according to site specific factors. Something that is viable in one place may not be viable elsewhere. Several other terms like green buildings, ecological housing, sustainable housing/communities, high performance buildings, environmental architecture etc., are also used in place of ecohousing.

There is also a big overlap between the concepts of eco-housing and Permaculture. Permaculture practitioners study and follow the patterns of nature to develop sustainable patterns of agriculture, land use and habitats, in order to avoid the negative impacts of industrialised agriculture.

### 1. 什么是生态节能住宅?

生态节能住宅没有确切的定义。它是一个不断发展的概念，试图将其限定在一个时间点会有妄下论断之嫌。生态节能住宅的爱好者提出一个全方位的概念，即通过不同的方法实现建筑环境的可持续发展。最常见的定义是通过对环境低冲击的设计方案创建一个舒适和健康的栖息地，比标准的栖息地消耗更少的资源，并且使用环保材料和产品。另一种定义认为，生态节能住宅在建筑环境里通过仿生学，模仿生态系统中的自我维持和循环过程。

生态节能住宅认定建筑物的基本目的是以合理的成本保证人体的舒适度、健康和生存，它提醒我们最好的状态是生活在和谐的生态系统和社会经济系统中。为确保人体舒适度和生存而产生的能源利用效率和效力不凌驾于任何界限。同样，使用自然资源也要谨慎，避免浪费，不应超出任何限定要求。提取—使用—处理是惯用的线性过程，将会被转换为一个能自我维持循环的过程。

生态节能住宅的定义、标准和重点根据场地的具体因素而有所不同。一些方式在一个地方是可行的，但在其他地方未必可行。绿色建筑、生态节能住宅、可持续发展住宅/社区，高性能的建筑，环保建筑等条款，也适用于的生态住宅。

生态住宅和永续农业的概念之间也有一个很大的重叠。永续农业的从业者研究并遵循自然本质，在可持续模式下发展农业、利用土地和栖息地，以避免农业产业化带来的负面影响。



World Climate Average:  
世界气候平均:



### Box 1: Biomimetics

(Makower, J., 2001, p.20) Biomimetics is a new science that studies the processes in nature, in order to imitate it and design solutions for human problems. An example is studying a leaf to invent a better solar cell. Nature and its constituents have been solving problems for millions of years, out of necessity. Humans could learn a lot by studying it.

### 小贴士1: 仿生

(马考沃, J., 2001年, 第20页) 仿生是一个新科学, 研究自然的过程以模仿和设计解决方案的问题。一个例子是通过研究叶子进而发明了一种更好的太阳能电池。出于需要, 自然与其成分已解决了数百万年来的问题。人类因它可以学到很多东西。

## 2. What are the approaches for achieving eco-housing objectives?

Many specialised tools and techniques could be used for achieving the objectives of ecohousing. Some of the cross-cutting approaches that underlies many of these tools and techniques are: Integrated Design Process; Life Cycle approaches; decreasing resource intensity; bioclimatic design; adopting traditional and local architectural practices; and the use of renewable resources.

### 2.1 Integrated Design Process

In a conventional design process, each one works within his area of expertise with minimum interaction. The Integrated Design Process is based on inter-disciplinary research and design. Rather than studying the individual building components, systems, or functions in isolation, experts from different disciplines collaborate to analyse the interrelated impacts on the economy, environment, society, building components and materials and find common solutions.

Through their collaborative effort they try to integrate different objectives like economic efficiency, environment friendly site planning, appropriate choices of materials and products, sustainable use of energy and water, provision of clean water, indoor environment quality and sanitation, waste water and solid waste management, and proper operation and maintenance.

## 2. 实现生态节能住宅目标的方法是什么?

许多专业工具和技术, 可用于实现生态节能住宅的目标。贯穿各领域的方法以多种工具和技术为基础: 综合设计流程; 生命周期方法; 降低资源强度; 生物气候设计; 采用传统的和当地资源的建筑实践, 以及使用可再生资源。

### 2.1 综合设计流程

在传统的设计过程中, 每个人都在其专业领域内工作, 很少有互动。综合设计流程是基于跨学科的研究和设计, 而不是研究个体建筑构件、系统或隔离的功能。来自不同学科的专家共同分析经济、环境、社会、建筑构件和材料之间相互关联的影响, 并找到共同的解决方案。

通过他们的协同努力, 试图整合不同的目标, 如经济效率、环保的地块规划、适当地选择材料和产品、能源和水资源的可持续利用、提供清洁的水、室内环境质量和卫生设施以及废水和固体垃圾管理、正确的操作和维护。





## 2.2 Life Cycle Approaches

The traditional compartmentalised approach considered each stage of a product's life cycle, separately. For example, the manufacturer was not much concerned much with what happened to the product after sales. The environmental manager was unaware of the design and manufacturing issues and used to be preoccupied with "end of pipe" solutions after the waste or pollution was generated. Eco-housing encourages the consideration of the entire life-cycle of the house: from design, through construction, use, maintenance and to end of life activities. Life Cycle thinking takes into account all stages of a buildings existence and considers all stakeholders.

The waste management hierarchy, based on the life cycle thinking, is an important part of the eco-housing concept. The hierarchy reminds us to act early on in the life cycle of the product to prevent waste generation. The highest priority is for preventing waste generation and the least is for disposal activities. The same concept is applied in the 3R (Reduce, Reuse and Recycle) approach.

Each stage has different characteristics and need different approaches. Eco-housing interventions are more effective during the early phases of the project, as illustrated in figure (facing above) given above.

Figure (Facing above): Influence of design decisions on life-cycle impacts and costs of an average European and North American building (Kohler, N. & Moffatt, S., 2003, p.14).

Life Cycle Assessment or Analysis (LCA) and Life Cycle Costing (LCC) are two of the methodologies used to apply Life Cycle thinking. Among these two, the application of LCA has mostly been limited to research projects due to the large effort and data required. More than the methodologies, the emphasis should be on the contribution of Life Cycle thinking to the Integrated Design Process to take into

## 2.2. 生命周期方法

传统划分管理方法通常分开考虑一个产品在生命周期内的各个阶段。例如，制造商并不关心产品的售后服务。环境管理者对设计及制造方面是不了解的，全神贯注于使用后产生的废物或污染的解决方案。生态节能住宅鼓励考虑房子的整个生命周期：从设计、建造、使用、维护到生命活动的结束。要考虑到建筑物生命周期存在的各个阶段，并考虑所有利益相关者。

垃圾管理层次会基于生命周期考虑，这是生态节能住宅概念的重要组成部分。该层次结构提醒我们要在产品的生命周期及早行动，以防止废物的产生。最优先考虑的是防止废物的产生。同样的概念也适用于3R（减少、再利用和循环再生）。

每个阶段都有不同的特点，需要不同的方法。生态节能住宅的干预在项目的早期阶段更有效，如对页上图所示。

对页上图：设计决策对生命周期的影响上以及欧洲和北美建筑的平均成本（科勒，莫法特，S.，2003年，第14页）。

生命周期评估或分析（LCA）和生命周期成本（LCC）是两个用于应用生命周期的方法。这其中生命周期分析的应用大多仅限于研究项目，需要投入大量精力和数据。除了以上方法，应该强调的是生命周期思想对综合设计流程的贡献，因为它涉及了所有的能源投入、影响和利益相关者。在少数情况下生命