

# **Status of EcoDesign in Architecture in Thailand**

Doolwit Tikul and Panya Srichandr  
Integrated Product Design and Manufacturing Program,  
School of Energy and Materials  
King Mongkut 's University of Technology Thonburi, Bangkok, Thailand  
doolwit@hotmail.com

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## **ABSTRACT**

Architectural designs could significantly influence environmental impacts both in short-term and long-term. The concept of ecodesign in architecture has been developed for some time and gradually being adopted in various part of the world. This paper examines the status of ecodesign in architecture in Thailand. The situation in Thai construction industry is briefly presented. Activities in various organizations are explored including legal bodies, educational and R&D institutions as well as professional societies and NGOs. General public awareness is also assessed. It is found that relevant organizations are doing their bits towards promoting environmental well-being but lacks coordination and concerted effort. Relevant infrastructures necessary for moving ecodesign forward are rather weak and inadequate. Practicing architects employ only certain aspects of ecodesign in their practice. In general, public awareness increases significantly in recent years resulting from public campaigns of various organizations as well as the frequency and severity of unusual natural phenomena in recent past. In sum, ecodesign in architecture in Thailand is only at its beginning but has the potential to move forward as all the parties involved; the government, the industry and the public, are willing to back the move.

## **Introduction**

Buildings significantly alter the environment. Building construction consumes 40% of raw stone, gravel, and sand globally each year, and 25% of virgin wood. Buildings also account for 40% of energy and 16% of water consumption annually worldwide [1]. Apart from energy and material consumption, building construction also contributes to environmental problems significantly. Energy saving in buildings has been considered and implemented since the nineteenth century [2]. In the 1970s, energy crisis led to more awareness of environmental problems [3]. Several countries have been promoting sustainable architecture and establishing support groups and agencies ever since.

Thailand is a country in South-East Asia with coasts on the Andaman Sea and the Gulf of Thailand. It borders Myanmar (Burma) to the north-west, Laos to the north-east, Cambodia to the south-east and Malaysia to the south. The total area of Thailand is 514,000 km<sup>2</sup> which can be divided into 2,230 km<sup>2</sup> of water and 511,770 km<sup>2</sup> of land. The population in Thailand is approximately 65 million[4], of which around 12 million live in the capital city, Bangkok.

In Thailand, ecodesign or green design or sustainable design has been known since early 1990s [5] conforming with worldwide trend. Some albeit slow progress has been made since then. It is felt that the matter should be taken much more urgently and seriously given current environmental situation. It's time to take stock so that we know where we are. Understanding of current status would provide us with solid platform from which we could move forward in the right direction.

This study attempts to provide an overview of current situation relating to ecodesign in architecture in Thailand. Activities in the Thai construction industry and other relevant organizations as well as legal and educational infrastructures are examined. Research methods include data collection via internets, field interviews and surveys as well as studying various reports and articles. The aim is to get as a complete picture of the status as possible.

## **EcoDesign in Architecture**

Ecodesign (also referred to as green design, sustainable design, or design for the environment) in architecture has been defined differently by various researchers such as Crosbie, Michael J. (1994) Cuito, Aurora (2000) and Vale, Brenda (1991) but all of them with the same purpose which is reducing or eliminating environmental impacts from architectural design [6,7,8]. Most current practices focus at one or a few aspects of ecodesign such as energy saving. This could be misleading as environmental benefits from one aspect might not necessarily be that beneficial over the buildings' lifecycle. A better concept of ecodesign in architecture should

cover the whole life cycle of buildings: using land efficiency, having quality and durability, using water and energy efficiency, concerning indoor air and environmental quality, choosing low-impact materials, design for reuse and recycling, standardization and modularity. Good green design should also reduce wastes, of both energy and materials. The goal is to reduce the amount of materials going to landfills as well as to reduce the impact on wells or water treatments plants.

Recycling of buildings and access to public transportation are also important. Ecodesign should therefore be performed by teams of not only architects but also planners, interior designers, engineers, landscape designers, owners, contractors and dweller in that area [9].

### Status and Trend of Thai Construction Industry

Since 2000, the Thai construction industry has been growing steadily as shown in Figure 1 [10] which showed the number of buildings being built each year. Most of the buildings are for residential purpose as shown in Figure 2 [10].

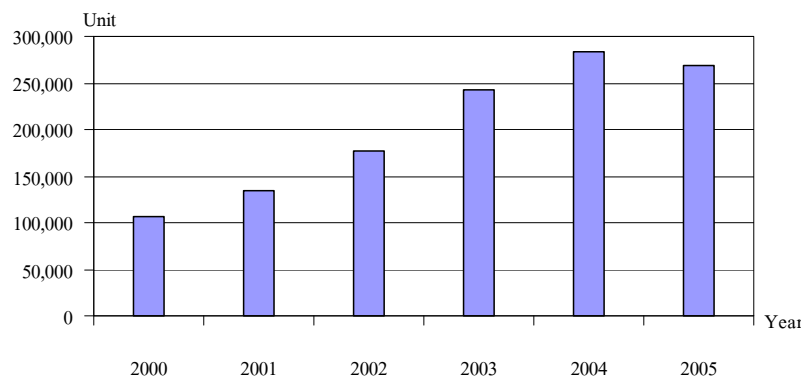


Figure 1 Authorized building 2000-2005

As for the type of building materials, trend of using virgin wood is going down accounting for only 5% (Figure 3) [10]. Prefabrication is increasingly popular both for private and public projects. For example, Ganda Property, a well known in Thai real-estate company, uses prefabricated construction technology in every project leading to consistent quality standard, fast, and clean, and customer satisfaction[11]. The technology will no doubt spread throughout Thai real-estate business.

The National Housing Authority (NHA), a state enterprise originally under the supervision of the Ministry of Social Development and Human Security, currently plays a significant role in developing and providing low-income housing. The project, named Baan Eua-Arthorn, is expected to provide 600,000 housing units from 2003-2007 and employs prefabricated construction technology [12,13].

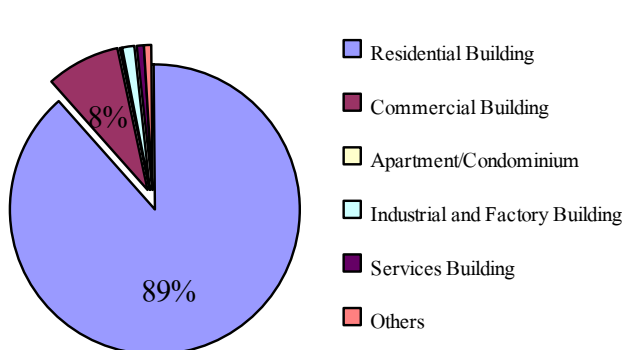


Figure 2 Type of building

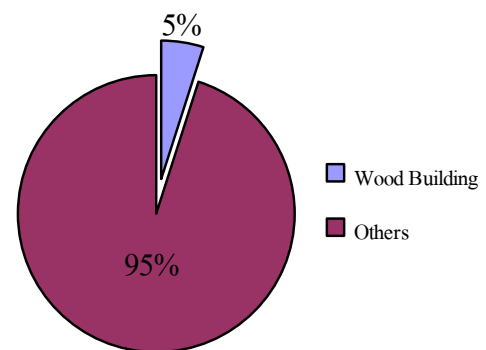


Figure 3 Ratio of using material of building-Construction

The building materials business sector, driven by external pressures together with their awareness, have also adopted their business concept towards developing more environmental friendly materials. Cementthai

Building Products Co., Ltd., Thailand's largest manufacturer of building products, for example, has adopted the environmental friendly concept "We think for the future". For artificial wood producing business, they have produced products without asbestos [12].

Energy saving campaigns have been active in Thailand for quite some time. Various incentives are provided by the government including financial incentives, expert assistance and 'demonstration models' for energy-efficient buildings[11,12].

### **Legal Infrastructure**

There are a number of legal measures aiming at promoting environmental well-being in recent years. The Tenth National Economic and Social Development Plan (2007-2011) [14] clearly emphasizes the importance of environment protection in all development projects. The National Quality of Environment Act (1992) covers environmental protection, establishment of environment standards, establishment of conservation zones and environment protection areas, preparation of environmental impact assessment report and pollution control by determining green areas, including plating of trees and preparation of report on environmental impact analysis for various projects and buildings; the enactment of this Act results in the issuances of several ministerial regulations [15]. The Building Control Act (1997) aims at environmental quality preservation[16]. The Land Allocation Act (2000) seeks to allocate certain percentage of land area in large real-estate projects for promoting public health and environmental quality preservation [17]. These are examples of legal instrument to counter environmental problems relevant to architectural design in Thailand. There are, and no doubt will be, many more laws, rules and regulations issued by various authorities from central to local governments.

### **Education and R&D Infrastructure**

There is no organization or agency dedicated to green building R&D in Thailand. There are a number of R&D funding organizations, for example; Health Systems Research Institute (HSRI), The Thailand Research Fund (TRF), The National Research Council of Thailand (NRCT), National Science and Technology Development Agency (NSTDA), National Metal and Materials Technology Center (MTEC), and also other institutes and universities. They support indirectly and directly some environmental research projects but only a few are directly related to architecture (less than 10%)[18]. R&D activities can be divided into 3 groups; energy saving and renewable energy, renewable material and indoor air and environment quality. Examples of R&D projects include: Energy Savings and Performance of the Cold-formed Steel-frame and Wood-frame Houses Developed for Thailand, Preliminary Study of using Recycled Plastics as Construction Materials, Analysis for Performance of Indoor Shading Devices, Producing Soil-Cement Brick with Husk Ash for Construction Materials, Performance Analysis of the Building Envelope, Industrial Production of Floor, Wall, Roof Tiles Using Raw Materials in E-Sarn Provinces

There are 26 private and public institutes or universities offering architecture programs at undergraduate and postgraduate levels. There is no undergraduate program dedicated to green architecture only a few electives such as, Energy and environmental technology, Environmental control in building, Energy management in building, and Energy conservation in building design.

There are some curricula at postgraduate level that focus primarily on environmental problems such as, Master of Architecture Program in Tropical Architecture of King Mongkut's Institute of Technology Ladkrabang, and Energy Conservation in Building Design Program of Silpakorn University.

### **Professional Associations / Societies**

There are a few professional associations/societies which are fairly active at promoting green architecture in Thailand. For example; the Association of Siamese Architects Under Royal Patronage (ASA) arranges annual exhibition to promote green or environmental activities such as The 20<sup>th</sup> (Architect'06) and 21<sup>st</sup> (Architect'07) International Construction & Decoration Technology, Equipments and Materials Exposition and Conference. The theme of Architect'06 was "Sense of Balance" which aimed at addressing environmental problems and wanted to show "How do we live with nature?" through energy and resource efficiency in architectural design. The theme of Architect'07 was "Leap to the Future" which emphasized environmental awareness of new generations of architects. In addition, ASA also publishes environmental articles in its journal (ASA), chronicles and other hard copies as well as arranges exhibitions about energy efficiency in the residential and commercial buildings.

Environmental Engineering Association of Thailand tries to improve the EIA process in Thailand. The Thailand Environment Institute (TEI) performs R&D and provides consultancy relating to life cycle inventory of building materials such as cement and steels.

Thailand Business Council for Sustainable Development (TBCSD) promotes environmental awareness within the business sector under the concept of "sustainable development". About 8% of its members are in construction material business [19]. TBCSD has collaborated with other associations and societies to establish the Thai green label scheme for choosing environmental friendly materials. In addition, there are some projects involve environmental protection such as the renovation of Klong Lod which is one of Thailand's historic canals currently facing severe pollution problems.

### **Practicing Architects**

From the survey of 197 Thai architectural firms and 124 practicing architects, it is found that most architects (72%) are aware of environmental problems and are prepared to implement ecodesign in their practice. Most of the architects believe that they have already taken environmental problems into account in their designs. In real practice, however, the first priority considered is normally indoor environmental quality, namely, quality of indoor air, comfort of people in buildings, reduction of air pollution, noise, dust and smoke in buildings as well as avoidance of use of health hazardous substances. Building maintenance is of secondary concern by emphasizing the design to ensure easy maintenance and repair and low maintenance cost. The third criterion is faster construction including convenient transportation. Other aspects such as the selection of environmentally friendly materials are of low priority.

The most pressing environmental problem as perceived by Thai architects is global warming, followed by air pollution and resource depletion. About 80% have some knowledge about ecodesign or green design but only about 10% employ proper ecodesign tools in their practice.

### **Public Awareness**

Public awareness in Thailand about the impacts of environmental problems increases significantly in recent years. This is due partly to the unusual natural phenomena such as severe droughts, widespread flooding, record high temperature, unusual tropical and hail storms etc. Thailand is 'losing' the coastal land area everyday and to date about 8 million square metres of coastal land is gone [20]. Campaigns and educational activities also increase public awareness. Organizations such as Green Peace, various government departments and local authorities are quite active in such campaigns.

### **Discussion**

The results of our research indicate that ecodesign in architecture in Thailand is still at an embryonic stage. Relevant parties from the private sectors, practicing architects, governmental organizations to NGOs and general public are well aware of environmental problems and trying hard to contribute to the efforts to mitigate such problems. There is much work to be done, however. We believe that, to be effective, a 'system approach' is needed. At present various parties are 'doing their own things' in a rather haphazard way rendering many efforts futile and unsustainable.

The increased popularity of prefabrication technology is in line with the worldwide trend [21,22,23]. In Thailand such popularity is derived primarily from economic reasons rather than environmental ones. This would be much more effective if reinforced by appropriate legal infrastructure and appropriate incentives. Legal infrastructure directly related to ecodesign in architecture is far from adequate and very weak compared with those of advanced countries. This is not really surprising in view of the fact that the awareness of the problems is only heightened in recent years.

Educational and R&D infrastructure is another important pillar for the progress of ecodesign in architecture. It is virtually impossible to move forward without knowledgeable personnel in sufficient numbers. This pillar is particularly weak for Thailand. Practicing architects need to update their knowledge and practice to incorporate environmental considerations in their designs. Effective ecodesign tools would tremendously help.

With heightened public awareness of environmental problems, this is perhaps the best time to strengthen ecodesign in architecture in Thailand. Although various infrastructures are not quite in place as yet, we believe that the situation is fertile enough for the seeds to grow. Many people are ready to join the troops against environmental deterioration provided that they can see the fruits of their contributions.

### **Conclusion**

1. The Thai construction industry in Thailand is growing steadily. Construction technology and popularity due to various benefits such as saving time and resources and being more convenient. Consumption of virgin wood is decreasing.
2. Existing infrastructure to support ecodesign in architecture is rather weak. R&D activity is limited. Legal infrastructure is not yet complete and effective. Incentives towards effective ecodesign are minimal.

3. Most Thai architects are aware of environmental impacts and try to reduce them through their designs. They pay a great deal of attention to indoor air and environmental quality while the other aspects of ecodesign such as selection of environmentally friendly materials receive much less attention. This is different from industrial designers who pay more attention to green and recycle materials [24].

4. Education and research activities in environmental friendly design in architecture is still lacking. The number of R&D personnel and practicing architects who really understand the subject matter is far from sufficient.

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