

Energy Efficient House for the Future

Thailand / Bang Kapi, Bangkok

13.777637, 100.570962

Client Name: National Housing Authority

Project website:

220 ,179 ,39,0.6

Project Description

Project is constructed under the research project by the Faculty of Architecture Thammasat University - Low-Cost Energy-Saving House for Housing in Global Warming - as a prototype of high efficiency housing.

Building Details

Type of Building

House

Type of project

New building project

Number of Floors

2

Gross floor area

120.11 m²

Net floor area

120.11 m²

Non Air-conditioned area

120.11 m²

Performance Standards

None

Total Cost

USD 87,653

Cost per m²

USD 730

Year of completion

2012

Year of occupancy

N/A

Project Team

Organisation

Thammasat University

General contractor

Wattanapattana Company Limited

Structural Engineer

Asst.Prof. Pusit Lertwattanakul, Ph.D.

Architech

Climate Analysis

Describe the local climate

Bangkok is in the central part of Thailand where usually experiences a long period of warm weather because of its inland nature and tropical latitude zone. March to May, the hottest period of the year, maximum temperatures usually reach near 40o C or more. The onset of rainy season also significantly reduces the temperatures from mid-May and they are usually lower than 40 o C. Bangkok usually has a short period of winter with a temperature of 20-25 oC. The relative humidity ranges from 70-80% throughout the year.

Design Approach

Site integration

Since it is prototype for high efficient house, there is no specific site for this project. So, this house is only fixed for its orientation. For the surrounding, trees should be planted to protect heat gain from radiation to the house.

Building design

All functions are oriented corresponding to movements of the sun results in there is a buffer zone to heat. Use technology of material properties to cool down the building along with shading from surrounded trees. Evaporative cooling by using on-site harvested rainwater is applied.

Special Feature

Natural Lighting

Skylight is added above the stairs to light up the main circulation in daytime.

Water efficiency

Collect rainwater on the project site and use in evaporative cooling process for house.

Passive heating/cooling

Large openings with shading device are designed for natural ventilation and removing internal heat. Evaporative cooling is applied by dripped water through the chain outside the windows. All of these applications require low cost.

Other features

Lightweight materials is selected for bedroom as it is easy to cool down at the nighttime. Thermal mass is used for living room to reduce impact of outside temperature during the daytime.

Energy systems

Interior Lighting

Compact Fluorescent

Exterior Lighting

None

Ceiling Fans

None

Air-conditioning

None

Lift

None

Energy efficient systems

- 5 Temperature and Relative Humidity sensors - Building is cooled down by passive strategy such as natural ventilation, evaporation, and thermal mass

Energy efficient systems

1.35 kW of PV panel is equipped on the roof. Energy generated, estimated for 4.03 kWh per day, will be used by lighting system, and pump
