A SUSTAINABLE EXPERIMENTAL PLATFORM FOR THE NET ZERO ENERGY BUILDING: A CASE STUDY IN NORTH CHINA

Abstract

This paper is based on a practical case called CIFI Demonstration Building located in the Cold Zone, which mainly aims to establish a domestic comprehensive experimental platform for the Net Zero Energy Building (NZEB) in China. To achieve this target, firstly, an active solar energy system including solar PV panels, thin-film PV glass and solar thermal plates is integrated to the building systems, aiming to generate adequate energy to counterbalance the annual operational demands. Secondly, in order to carry out the comparative study, the whole building is separated into three independent units sharing the same spatial topology which highly encourages the passive natural lighting and ventilation, while integrating with different sustainable strategies and technologies respectively, such as the double-skin ventilation curtain wall in Unit A, the timber louver shading facade in Unit B and the highly integrated double solar photovoltaic glazed facade in Unit C, etc. Thirdly, the entire building performances (e.g. energy balance, indoor thermal comfort, air quality and visual comfort, matter and material flow etc.) are constantly traced and monitored with the help of the pre-plugged sensors and meters in the units. And last but not the least, by analyzing and comparing the firsthand data, the feasibilities of the general passive design methods and the specific sustainable strategies and technologies are all carefully verified, which are very instrumental to feedback to the decision-making and design phases, and to become a reference to the similar kind of solar buildings in the north China.

Keywords: Net Zero Energy Building; Solar energy; Building performance; Comparative study;

Fig. 1: Solar energy systems integrated to the building systems
Fig. 2: Passive design methods and technologies

References:


