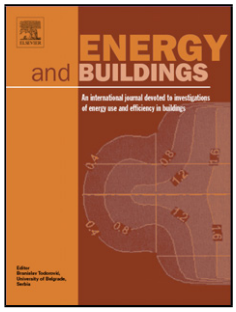

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Feasibility studies on net zero energy building for climate considering: A case of "All Green House" for Datong, Shanxi, China

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Abstract

This paper will discuss the feasibility of a net zero energy house design targeting for energy balance, financial and environmental sustainability from the initial planning to the final construction for Northern China. A residential house as an experimental objective, which could satisfy an average family's daily needs are in Datong, Shanxi Province in China. Dynamic thermal simulation of the indoor environment, house geometries, solar electric and hot-water collectors, appliances are set in the house. After analysis of the integrated performance of the house, a net zero energy building with the best system configuration predicted by hardware and software simulation are validated. Furthermore, the house is precisely energy monitored and energy controlled after construction. The case study shows that the innovation of a net zero building should be considered as a technological improvement and with a social approval by the occupants of the house.

Key Words: Net zero energy building Local climate consideration Design renovation feasibility

1. Introduction

Modern buildings have a tremendous impact on energy and the environment, especially in China with new residential, commercial and public buildings that use more than 40% [1] of the primary energy, resulting in a series of energy crisis, resource exhausting, and environment pollution issues that have been impeded the development of the economy and society with many serious issues. Buildings are responsible for 33% [2] of worldwide energy-related GHG (Greenhouse Gas) emissions, and the energy impacts are largely influenced by the climate. Now a series of studies by the Architecture Scientists and Energy Professors aim at low energy consumption with comfortable living environment in China. The net zero-energy building (ZEB) that including residential and public buildings with greatly reduced energy needs through efficiency gains such