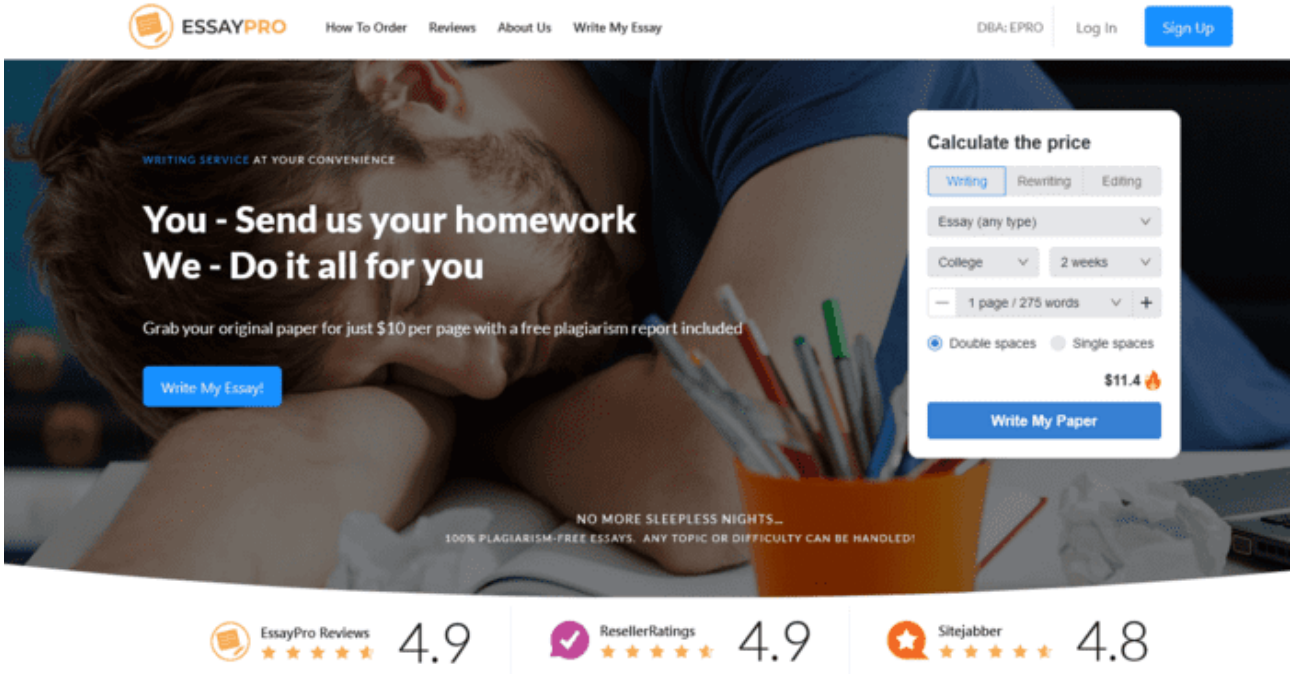
Feasibility of Earth-Tube Ventilation System in Chinese Buildings Essay



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Introduction

As World Business Council for Sustainable Development (WBCSD) demonstrated, buildings consume about 40% of final global energy and emit the same portion of carbon dioxide (CO_2) [1]. Meanwhile 85% of a building's gas emissions are expected to be caused by heating, cooling and lighting activities and commercial buildings produce approximately one third of energy-related CO_2 emissions worldwide [2]. European Union demonstrates that currently the energy utilized in space heating and cooling occupies about 46–50% [3] of total energy usage and CO_2emissions in UK. Specifically in China, buildings currently accounts for about 30%e36% of the country's total energy consumption and CO_2 emissions [4],[5]. Therefore, scientists are trying to find out new technologies to reduce the energy using in this area. Earth-tubes ventilation system (ETVS) has been not only theoretically but also practically testified to be a potential effective system to reduce energy consumption in buildings. Evidences show that in March and July 2010 the system provided 62% and 86% of peak cooling load with COPs of 3.2 and 3.53 correspondingly[6].

Although this system has been noticed since 70's [7], it did not end up enjoying wide

acceptance. The main reason can be the poor performance of the system in reality. According to the study of Eicker et al. [8] in the cooling performance of an earth-to-air heat exchanger system, they obtained a good coefficient of performance (COP) of 30 while the effect of the earth tubes only shares 20% of the cooling load. There are also many other potential problems [9], such as condensation and water seepage, radon seepage from the soil, mold and cleaning and maintenance.
This interim report will firstly present studies done by other researchers and the discussion of theoretical solution to resolve the existing problems of ETVS and make it more applicable