

CURRENT PROGRESS IN ADSORPTION TECHNOLOGIES FOR LOW-ENERGY BUILDINGS

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Abstract

More than half of the world's population currently lives in cities. An essential constituent of future sustainable cities is energy efficient and ecologically sound buildings which ensure high levels of comfort and convenience without reducing the standards of living. At present, a significant part of primary fossil fuels is spent for heating/cooling of buildings, thus, greatly contributing to total GHG emissions. Moreover, heat losses in building are still unacceptable and can reach 40-70% of the consumed heat. In this review, we consider typical heat losses in dwellings taking the United Kingdom and the Russian Federation as examples. The role of adsorption-based technologies for more rational use of heat in buildings is discussed. Basics of inter-seasonal adsorptive heat storage (AHS) are briefly considered. A tentative upper limit of the AHS storage density is estimated. Current practice of inter-seasonal AHS and novel smart adsorbents promising for this emerging technology are overviewed. Since a portion of the heat losses in ventilation system significantly increases in modern buildings, an adsorptive regeneration of heat and moisture in this system is discussed. Finally, we briefly consider drawbacks, perspectives and optimization trends of the AHS in buildings.