

Climate Change and Global Warming: The concept of energy efficiency in residential buildings in rural settlements in a mountainous region - Akbarov A - Tajik Technical University, Republic of Tajikistan

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Abstract

Tajikistan is a mountainous country, where 93% of the territory consists of mountain massive with characteristic of the vertical climatic features. The complexity of the terrain and the diversity of heights cause of large climatic differences in certain regions of Tajikistan. The mountainous regions are open with the humid western air masses intercept most of the precipitation and cold in the winter period. The noted feature determined the specifics of the development of settlement on the territory of the republic. The main population is more than 85% located on the territory of valleys, foothills and lowland plains, at altitudes from 600 meter to 1500 meter above sea level. The remaining 90% of the mountainous areas are occupied by the rest (15%) of the republic's population. The existing natural and climatic factors affecting the formation of residential buildings include: increased level of solar radiation and air temperature, orography (terrain) of the terrain and wind regime, as well as seismic, which affects the volumetric planning organization and constructive solution of the residential building. Since 1990, we are engaged in scientific research and searching of the natural ways of reducing the energy consumption of residential housing, the architectural and planning organization of building settlements and small towns for the conditions of the mountainous terrain of Tajikistan. They carried out a series of typological studies on the form of the house and the level of their thermal insulation, the orientation of the house, the methods of using solar energy in the housing space, and worked out the rules for designing houses from local building materials in mountain villages. There were identified the factors and conditions of the formation of traditional houses in various regions (foothills and mountain belts) of the country. Methodical instructions and recommendations on problems of planning and building of low-rise apartment houses have been published. On the basis of researches on the energy efficiency of public housing have been developed a new

types of residential buildings for the construction of mountain villages. The houses from the local materials are heat-intensive, and protected from the cold in the winter. In the summer period they will be keep cool because of the heat engineering characteristics of the stone, the clay-rock material of the walls and the wooden ceiling. These houses are economically accessible and practically feasible for self-construction of poor families in Afghanistan and Tajikistan. They include a lightweight construction made of a wooden frame filled with raw brick. Their energy efficiency is achieved on the basis of a compact planning solution and organization of residential development of the village with a reduction in the area of the outer walls on the mountain slope, as well as efficient use of solar energy. The brief presentation of a pilot project of a residential complex of the village for 3000 residents for large families in a mountainous area will be given in the report. The project uses a series of energy-efficient residential houses and social infrastructure facilities based on the new principles of a compact residential development solution, taking into account the environmental protection of the mountainous region.

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