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# Scientific Fundamentals and Investment Mechanisms for the Implementation of Socially and Energy-Efficient Technologies of Creation and Intelligent Control of Low-Rise Building Lifecycle

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## Abstract

This article is a description of the conducted work and analysis programs to address one of the key tasks facing Russia - the decision of a housing problem. The result must be qualitatively new level of the state of the housing facilities, they are based on the principles of creating a safe and comfortable, environment of human activities, compliance of the housing facilities with modern requirements for environmental and energy efficiency, creation of conditions for improvement of the demographic situation, the implementation of an effective migration policy, reduction of social tension in the society, increasing the share of people who have the opportunity to purchase or build individual homes by private and/or borrowed funds, improvement of public satisfaction with the level of housing and communal service.

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## 1. Introduction

The solution of housing problem is one the key Russian development tasks. Its solution The set of measures for its solution are defined in the framework of the state program of the Russian Federation "the Provision of accessible and comfortable housing and communal services in the Russian Federation", approved by decree of the RF Government from 30.11.2012, №2227-R.

As a result of its implementation must be a qualitatively new level of the state of the housing facilities, they are based on the principles of creating a safe and comfortable , environment of human activities, compliance of the housing facilities with modern requirements for environmental and energy efficiency, creation of conditions for improvement of the demographic situation, the implementation of an effective migration policy, reduction of social tension in the society, increasing the share of people who have the opportunity to purchase or build individual homes by private

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and/or borrowed funds, improvement of public satisfaction with the level of housing and communal service by 2020. In the annual address of the President of Russia to the Federal Assembly 12.12.2013, identified new approaches to implementation of the program of affordable housing. In its framework until the end of 2017 planned to construct not less than 25 million square meters of affordable housing with the required social infrastructure. In this regard priority was developed by the Ministry of construction of Russian Federation as the program "Housing for Russian family" is the implementation of low-rise construction projects, with a best estimate of the town planning and architectural solutions, using new approaches to the design and industrial construction in the segment comfortable, energy efficient, and environmentally sound economy-class housing provided telecommunications and information services.

The group of authors have set up the scientific basis and investment mechanisms of the of social and energy-efficient technologies implementation of large-scale low-rise residential development in the all life-cycles stages intellectual control area. It bases on three mutually integrated analytical functional subsystems:

- promising low-rise buildings energy-ecological modelling;
- the effective low-rise buildings' life-cycle estimation;
- low-rise residential development projects' management.

## 2. Laboratory approaches

It was created Testing Laboratory Centre (fig.1) in MSUCE on the over 12 500 sq. m. area for practical approval of energy-efficient technologies of creation and intelligent life-cycles' control. It is unparalleled and bases on 30 authorial patents. Completes experiments within five years (since 2009) have allowed to achieve practical building energy consumption reduce from 25 to 75 per cent for different resources' types and effective life-cycle stages.



a)



b)

Fig. 1 "Smart City", MSUCE: (a) overall view, (b) laboratory.

Integrated implementation model system of low-rise construction project management analytic subsystem has functional structure:

- portal with interactive visualization system;
- structured database aggregate data;
- the actual project management system, including modules of land plot selection, risk management, financial modelling, project management, quality control, marketing, sales management (including mortgage mechanisms), legal support of transactions, construction site / village operation control.

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