Allocation private building in urban city and along the transport arteries for creating a modern energy-efficient living environment

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Abstract. This article submits for consideration the structuring elements of the “private sector” development system, the so-called architectural heritage of the Russian province [1]. Three types of development, still present in central parts of settlement systems, i.e. parts of historical value, are revealed. Common features of private plot development for the majority of middle-scale and small towns are characterized. Dependence of the types on various factors: ethnical, natural (geographical), economical, is revealed. It is important to determine which buildings are located along the transport arteries. Does it have historical significance and cultural value, since it forms the image of the city. The outgoing line passes, as a rule, through the entire settlement system and leads to the central part. Basic principles of formation of historically emerged development types, such as blocks, streets and side streets, are shown, and also problems needed to be solved by the means of urban planning are generalized and casted.

1. Introduction
The territory of individual housing development within towns (hereinafter – private sector) is a detached and functionally consolidated area of man-formed space, within boundaries of which a complex of basic social activity types is realized [2]. Generally, reorganization of this area is an additional burden on the executive authorities. Private sector in urban system can be compared to the private sector of economy, such a part of country’s economy that is not under state control [3]. The rate of understanding of low-rise housing problems, of reconstruction issues, of reorganization of common use areas, as well as the rate of understanding of public needs is extremely low [4]. This can be seen from the absence of urban planning regulatory system in the sphere of demolition and major repair of freestanding buildings and communications. It is impossible to solve the problems of private sector modernization and energy efficiency by narrowly focused municipal programs; a complex reconstruction of such blocks is needed [5]. In order to develop complex programs we suggest identifying types of private plot housing in settlement systems (Figure 1).

2. Classification of private plot development in the settlement system of middle Volga region.
Formation of modern urban space. Methodology of reorganization of typical private-home districts, for example, in cities of the middle Volga region. Identifying the extent of development of this kind in the settlement system, study of moral and physical deterioration, determination of the share of public spaces, transport and pedestrian links, defining the vector of development. The main problems of these districts, analysis of global experience in this field. Proposal for reorganization of the street.
During the study of private plot development in the cities of middle Volga region, we apply a system method, which helps to reveal peculiarities and principles of space planning formation of the private sector, to understand its structure elements and to identify vectors of district renovation and development.

![Types of Development on Private Plots](image)

**Figure 1.** Private plot development in the settlement system

### 2.1 Free landscape housing type

The housing type largely depends on the geography of the site [6]. For instance, free landscape housing is more frequent in khutors (or hamlets) and in settlements on a difficult terrain. Features of the free landscape housing type are absence of building lines, considerable distance between dwellings, and house orientation towards relief (or river), but not towards transport infrastructure. Examples of this development type can be seen in the middle Volga region on high and steep banks of the Kuybyshhev Reservoir, where since ancient times towns were formed like panoramas seen from the river (figure 2).

![Panorama of the City of Ulyanovsk from the Volga River, 1950s](image)

**Figure 2.** Panorama of the city of Ulyanovsk from the Volga River, 1950s

### 2.2 Regular closed housing type

Regular closed housing type has spread as the first urban planning documents have been adopted. In its base there was typical building in accordance with the preliminary plan, which distinguishes it from free...
planning development [7]. It is further seen in areas of country house (or dacha) construction and cottage development on the outskirts of settlement systems, while in the central parts towns there is mostly linear mainline adjacent housing type. The major features of the regular housing type in the private sector are the following: blocks are not more than 150 meters long, there are one-way roads not more that 4-5 meters wide, there is a lack of social and utility service objects within the blocks, and a lack of pedestrian infrastructure and public transportation.

2.3 Mainline adjacent housing type
Houses of the mainline adjacent type are located along major transport lines, mostly outbound streets and avenues going out of town from the city center. When analyzing the main territories, it is important to determine which buildings are located along the transport arteries. Does it have historical significance and cultural value, since it forms the image of the city. The outgoing line passes, as a rule, through the entire settlement system and leads to the central part. This development type is regular as well, with a distinctive orientation towards a main street. The major distinctive feature is its lineation and blocks length, which is not recurrent [8,9]. Near the building lines of private sector, historically formed along the mainline, new blocks are built, usually high-rise, and this leads to switch of functional usage of land plots and to vertical development of territory with higher building density (Figure 3).

![Figure 3. Linear, mainline adjacent housing type in town settlement system](image)

3. The main problem in privet-home living
The private sector in England contains some of the poorest quality and least energy efficient properties in the country as well as housing more vulnerable households than any other sector. Similar issues exist in many countries around the world including New Zealand, USA and Russia [10].

The choices that occupants make regarding energy are constrained by the material characteristics of a property: something only the landlord can alter. Enduringly poor conditions in the sector indicate that an initiative that convinces landlords of the benefits of improving energy efficiency remains elusive. Based on a review of existing research and 30 interviews with landlords, this paper identifies factors which deter landlords from acting to improve energy efficiency. Factors include lack of knowledge regarding the consequences of energy inefficiency and possible solutions, the absence of direct financial incentives (the principal-agent problem), local housing market and cultural factors.

Occupants of such properties endure dangerously cold homes and fuel poverty but have little direct influence over the energy performance of the properties they live in. The choices that occupants make regarding energy consumption and the amount of money they spend on it are, to a large extent, constrained by the material characteristics of a property (such as its thermal performance and mode of heating): something only the landlord can alter. Enduringly poor conditions in the sector attest that not enough is known about how to persuade private landlords to improve the energy performance of their properties. By drawing on insights from a case study of private landlords of poorly performing properties...
in a town in the north of England, this paper aims to add to our understanding of what discourages landlords from taking action to improve energy efficiency and how these barriers might be overcome. By better understanding landlords' decision making processes, the paper also aims to identify factors which may be harnessed to motivate landlords to invest in energy efficiency [11].

It is important that owners and energy efficiency advisers are made aware of the advantages of a whole house approach as against installing measures on an individual basis. The whole house approach will result in the installation or more effective and costly measures than if one proceeds piece meal [12].

4. The main task of urban planning
A modern city is constantly changing. City development problems alter as well as means of their solutions. The image of the city, public behavior and urban culture are changing. The city is an object of professional studies and project activity of an architect and urban planner. By revealing the city’s framework and managing its formation the urban planner gets the chance to affect the components of urban realm, forming its material substratum or structure. This is especially true for the private home districts as undeveloped areas in Russia regions.

5. Conclusions
The results of the research lead to the conclusion that there are a number of city planning problems to solve. The structure of the private sector is a complex of public, economical, technical, architectural, as well as artistically, sanitary and hygienic factors. The major goal of urban planning is to solve the modernization problems of these structure elements as economic components, by using modern technologies and means, combining them with the existing ideology of urban realm and of development tendencies.

There are some cities where can’t avoid so to stay vertical development and centralization. But in Russia, country who shave rich free landscape in the central regions. We still can try to save stable, comparable to human-size and historically true environment. Guided by international experience in this matter, it seems possible to transform the areas of private houses of historical centers of cities to a modern comfortable living space.

References
[1] Lokotko A I 1987 Soviet Etnography 4 pp 114-127
[2] Osyatinitsky A I 1965 Development of cities on the Volga River (Saratov) p 191
[3] Yaralov Yu S 1975 Architecture of the Soviet Russia (Moscow) p 222
[4] Interfax 2007 Financial Economic Portal
[5] Bessonov M S 2015 Young Scientist 12 pp 386-388
[6] Ivanova Ye V 2007 Vestnik 18 pp 132-134
[7] Lisitsina A V 2014 Architecton: universities’ news 45 pp 53-63
[8] 2015 The Main Architectural and Planning Department Album of typical solutions of complex improvement of Moscow outbound line areas (Moscow) p 598
[9] Garner S Scott K Grossman K 1998 Historic roadside development structures on Minnesota Trunk Highways (Minnesota) p 242
[10] Barton B. 2012 Energy Efficiency and Rental Accommodation: Dealing with Split Incentives. Report for the University of Waikato Centre for Environmental, Resources and Energy Law
[11] Ambrose A. 2015 Indoor and Built Environment 24 (7) pp 913-924
[12] Public Affairs Company 2016 Improving the energy efficiency of private rented housing (England, Sheffield) p 88