

akumulacyjności cieplnej, termoizolacje transparentne, przegrody przezroczyste z automatyczną regulacją nasłonecznienia i infiltracji powietrza, „cieplarnie” na elewacjach południowych. Dobudowane na elewacjach południowych istniejących budynków „cieplarnie” w zimie ograniczają o 2..5 % straty ciepła, a w okresie wiosny i jesieni są źródłem podgrzanego powietrza [1]. Przy zastosowaniu pośredniej wentylacji przez „cieplarnię” można również uzyskać redukcję zapotrzebowania na ciepło w sąsiednim pomieszczeniu o około 15..20 % [1].

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PROBLEMS OF HOUSING RECONSTRUCTION AND MODERNISATION IN RUSSIA

For the West European countries years 40..50 became a period of reconstruction of their residential building structures ruined during the II World War but also the period while this type of buildings achieved the high standards. In the case of Soviet Union situation was quite different. The condition of residential building resources constructed before the II World War couldn't be called satisfying. For that reason after the war 1/4 of the state budget income of Soviet Union have been reserved for the residential building needs. The State becoming practically the only investor (co-operative societies participated only in 10% of global number of new-buildt houses) created a strong house-building industry starting from 1950. During several years more than 200 plants producing prefabricated large scale elements of housing structures have been established. This type of building seems to be an appropriate way to deal with hard problem of housing indigence. Still in the end of 50. more than 90% of families lived in so called „communals” - residential structures which - according to the decisions of authorities - used to be occupied by several families, one separate room for each family. This situation - absolutly grotesque - caused by bolshevik's revolution couldn't be continued endlessly despite the ideological pressure and promotion of commune-house model forced by the main ideologists of the system. Though described situation is still an actual problem - appearing with different intensification in the main

towns of present Russia and on the territory of the former republics of Soviet Union – the passing time changed the main proportions. Compared to 1950 situation is much better and in the middle of 80. more than 80% of towns families used to occupy inostensible and small area but individual apartments. Despite higher mentioned limitations the factor of living area occupied by one person increased 3 times. During 60. – in ten years period – more than 100 thousands of 5-storey building have been constructed and actually 20% of town population of Russia lives in these building structures. In later years intensive investment activity (with the aid of industrial methods) have been maintained; this in the middle of 80. have brought the result: the factor of 2,3 mln flats (annually) provided for social consumption. In 90. economic transformations caused regression and more than 2 time decrease of the new build houses.

The probable reasons have been following:

- complicated and unclear character of property transformations in Russia;
- Russian crisis;
- free market influence on prices of building materials and energy.

At the same time there comes a radical change of property forms connected with residential buiding investment in Russia – completely different from the one that used to function during the communist period. This actually generates changes in the area of investment establishment and forces generally different policy of building industry in the sector of producing building structures, novelisation of legal acts etc.

Actually constructed residential building structures financed from the state, federal or municipal reserves assume the forms of multifamily building structures and it's number of storeys generally depends of economic and urbanistic limitations

Mostly there are 4, 9, 10 storey staircase type buildings. Multifamily buildings with the bigger number of storeys (12, 16, 17, 22 storeys) are constructed only on the area of the biggest towns. Actually the problem of housing structures in Russia is determined by „The Federal Russia Law defining the basic rules of the federal housing policy” and by the process of privatisation. The law not only determines all the range of new forms of property for the resources of housing sector (private property, social organisations property, municipal, federal, state property etc.) but also decides about the ways of transforming one sort of property into another. Citizens received also the possibility of buying and possessing apartments with no limitation of it's number, size and value, the possibility of buying it by the stock-exchange or auction, privatisation of the houses from state or municipal reserves and the possibility of building one-family houses. The share of social apartments in the global number of state and municipal resources is determined by the state or local authorities and actualised every year.

Parallely to the modification of low: the process of no-cost privatisation have been carried out: up to now more than 50% of state apartments and almost 100% of co-operative building resources became a private property of citizens.

Both of this factors show peculiar social-economical character of housing problem in Russia: the apartments are no more the object of distributive state policy and became an article of trade and element of free-market relations. Free market of bulding products also reveals it's strong influence on urbanistic structures and forces the change of forms from extensive into intensive; the attention is mostly concerned on reconstructio of central and neighbouring to the center districts of town; there efectiveness of invested money achieves the highest level.

New formed market of building products changed many of the prognoses describing expected town development of Moscow in the plan elaborated in 1991-92. According to the plan prevailing part of housing structure (small bungalows as well as advanced resi-

dential buildings) should be situated in suburban area, 50 km out of the main high-way surrounding the capital town. Confronted with the reality, the idea have been specifically changed. Suburban, small-house building activity appeared as the one of high intensity but chaotic character. The houses have been situated in the part of suburban area laying much closer to the town center than it have been planned and became the district of the „second“ houses possessed by the richest social class; this had no influence for solving the difficult problem of housing indigence.

In Russia years 90. bring the change of apartment model and consequently the model and multi-family building structure; it's standards are much different from those that used to function in Soviet Union reality. The apartment desing respects functional diversification of the space: large entrance hall (usually with the daylight) – visiting room – dining room. In the same time functional solutions and equipment of kitchens and bath-rooms are change and modernised.

The construction of housing structures is also changing. Up to 90. the panel building structures used to dominate. The system of brick walls completed by concrete construction elements (foundations, floors, stair-cases etc.) have been on the second place. Other building systems: the mix of big and small blocks, frame-slab system, monolite-prefabricated system and others together make a part not bigger than 10% of global building production. In the actual conditions of transformation and domination of the free market economy, panel building still is on the first place but number of other building systems (and variations of the systems) respecting economical realities enlarges. Mixing of different systems of constructional elements is in use as well as connections of brick and monolythic walls, monolythic and panel elements etc. The type of building system is also correlated with the height of a building. In 2 and 4 storeys buildings the panel system is replaced by the more economical systems of construction elements completed by the external walls made of cellular concrete. For the multi-storey building the panel system is economically justified specially if some elements of the construction are replaced by the more effective: monolithic by the multi-ply external wall structures (better thermo-isolation), flat-roof replaced by the more effective attic structures or mansard roof of different shapes.

The trends of renovation and reconditioning of the town structure are also changing. The standards respected in the process of urban planing have been changed, specially in the part connected with the reconstructional works. In 70. the majority of European capital towns have been the area of wide range of activities and experiments cocentrated on the renovation of historic buildings situated in the town centers. Improvement of the sanitary conditions (prolongation of the natural insolation of the apartment interiors, ventilation of the town territory and growth of greenery) and modernisation of infrastructural technical equipment have been the main reason of these enterprises. From the point of view of town planner renovation means usually reduction of building density. That was the way the renovation of Saint Peterburg and Moscow suburb have been realised. General rules of renovation however work against the economic interest of investors who - sometimes overcrossing the planning standards, - increase density of buildings in reconstructed town districts and change for worse it's sanitary conditions.

In arriving years the reconstruction of districts of multi-family building constructed in 1950-60 is expected. Except obvious defects of the functional properties and architectural form these building structures fulfill all the requirements such as aeration of the urban space, condition of the town flora and insolation of apartments.

The main impulse to take up the modernisation initiative have been „moral devaluation“ of designed and realised technical and architectural projects. Despite the correct insolation of a town space during the summer months, in winter time microclimatic conditions of the building structure for the prevailing number of buildings is far from satisfying.

Moreover free-standing 5-storey residential buildings constructed in bigger town appeared to be unprofitable economically because of the building density factor; another complication appeared because the buildings have been situated in the immediate vicinity of the historic town centers. The use of the new industrial construction for this type of buildings with no exploitation experience have brought sometimes technical problems (mainly connected with the thermal and acoustic insulation) and those defects should have been removed in the process of modernisation. Already in the end of 70. critical opinions of this type of buildings have been the reason of it's modernisation.

To find most rational ways and methods of modernisation for the town structure, starting from 1950-60 the action of design competitions have been organised – it was expected that it's results will show the possible ways for modernisation of these resources. For instance in 1987 the design competition have been organised to answer the question of modernisation and reconstruction of residential buildings of the 1-st stage of industrialisation.

Anyway it's only now as the ideas are put into practice and renovation of housing resources comes true. The reconstruction is held on the basic of design analysis. As a result of these works the density of a building structure significantly increases (from 6 thousands apartments per 1/2 ha to 15. 16 thousands) with no degradation of sanitary and microclimatic conditions. The increase of the building density is achieved in several ways, by the:

- 1: Superstructure – overbuilding the additional 2 storeys without strengthening the existing construction and foundations.
- 2: Applying building additions connecting separate houses, etc.

Sometimes compositions of the solids became very complex and create half-open spaces of the inner courts (fig.1; 2).

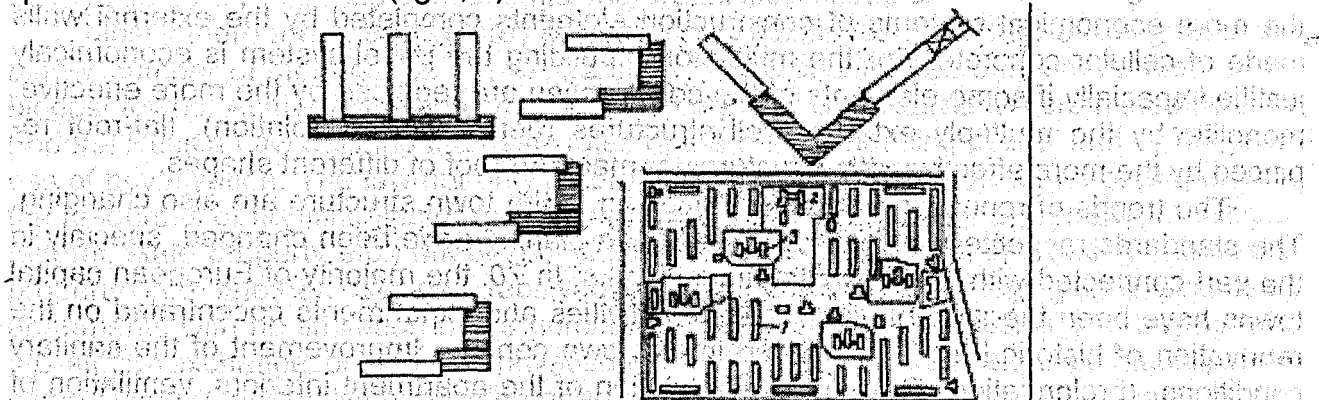


Fig. 1 Schematic examples of increasing the building density

The main failure of the „economical flat” and dominating reason of owner's dissatisfaction is too small space reserved for kitchens, bathrooms and halls, double-exit rooms etc. These faults are fully eliminated system of a building. During the complex modernisation of a micro-district, what means a modernisation of analysed groups of the buildings, the increase of a building density arises as a result of filling the micro-district area by the new buildings (new standards of a town planning provide higher parameters of a building density). That is the way „the houses of the II-stage” start their existence usually as 17 and 22 storey structures. For the buildings of a longitudinal supporting wall construction changes mean usually removal of the transverse walls and replacing one sanitary space by the two another: the small-one - next to the entrance door (this makes possible enlarging the space of the neighbouring kitchen) and the second-one, additional, situated in the area of sleeping rooms (fig.3, A).

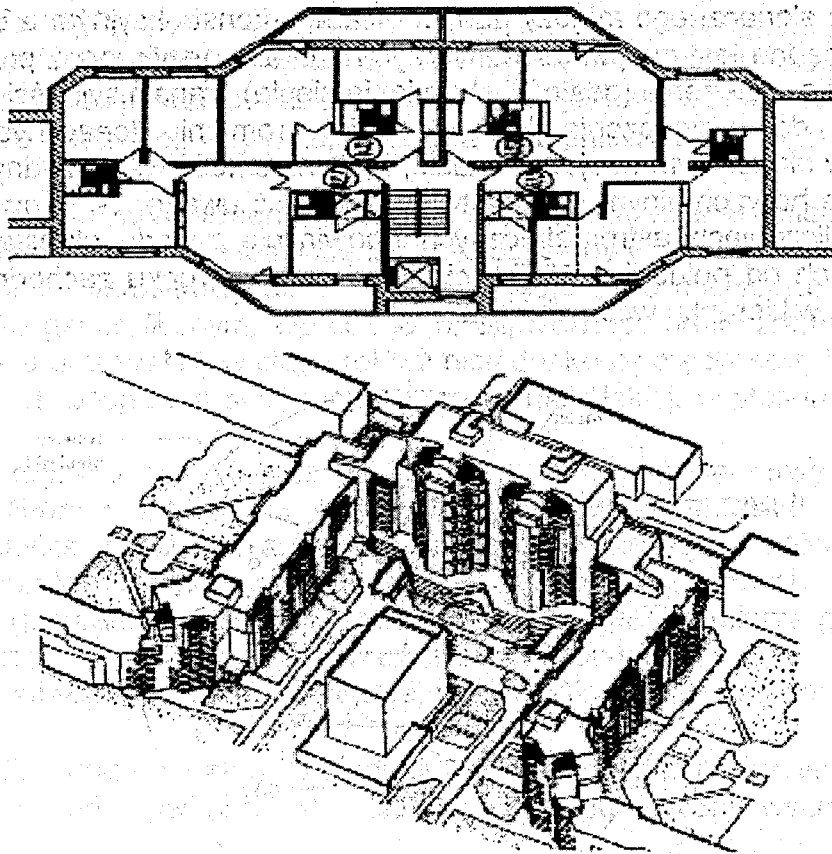


Fig. 2.

The example of increasing the building density in Moscow, Profsoiozna street (architect Zelikin L.)

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KĄT PADANIA PROMIENI SŁONECZNYCH NA DOWOLNIE USYTUOWANĄ PŁASZCZYZNĘ PRZEJMUJĄCĄ PROMIENIOWANIE

Priorytetowym problemem, szczególnie dla krajów leżących w strefie klimatu umiarkowanego i zimnego, jest od momentu kryzysu lat 70. ubiegłego wieku, poszukiwanie sposobów oszczędzania energii i zastępowania energii otrzymywanej w sposób konwencjonalny, energią pochodzącą ze źródeł niekonwencjonalnych. Szczególnie dużą uwagę poświęca się rozwiązaniom pozwalającym na pozyskiwanie energii z promieniowania słonecznego, docierającego do powierzchni Ziemi. W tym zakresie występuje wiele rozwiązań konstrukcyjnych, pozwalających na pozyskiwanie energii promieniowania słonecznego i przetwarzania jej na energię elektryczną i ciepło, wykorzystywane m.in. do ogrzewania pomieszczeń i przygotowania ciepłej wody użytkowej. Ponadto, ze względu na poprawiającą się izolacyjność cieplną przegród budowlanych i radykalne ograniczenie z tego powodu strat ciepła, coraz większą rolę w bilansie ciepła pomieszczeń ogrzewanych odgrywają zyski ciepła promieniowania słonecznego. Nie mniej istotnym faktem jest wzrost oczekiwań użytkowników pomieszczeń, m.in. mieszkalnych, administracyjnych itp. w odniesieniu do komfortu wizualnego, oświetlenia pomieszczeń światłem naturalnym, tworzenia stref tzw. ogrodów zimowych. Do wszystkich tych zagadnień, wymagających na różnych etapach ich analizowania, stosowania modeli matematyczno-fizycznych wymiany energii