

**Faculty:** The Faculty of Architecture and the Built Environment

**Department:** Architecture

**Programme:** MSc programme Architecture, Urbanism and Building Sciences

**Studio:** Explore Lab 17

# **Mass-Housing: Tendencies and Modernization**

Research paper

**Author:** M. Šutavičius,

Study number: 4254791

Email: [mindaugas.sutavicius@gmail.com](mailto:mindaugas.sutavicius@gmail.com)

**Mentor:** Y. J. Cuperus

May 2014



## Contents

|   |    |
|---|----|
| 1. INTRODUCTION.....                    | 5  |
| Method description .....                | 6  |
| 2. INTERNATIONAL CONTEXT .....          | 7  |
| 3. MASS-HOUSING IN SOVIET UNION .....   | 19 |
| Policy.....                             | 20 |
| Utopia .....                            | 20 |
| Pollution.....                          | 21 |
| Construction .....                      | 22 |
| Life span.....                          | 24 |
| Economy of Scale.....                   | 26 |
| 4. CASE OF LITHUANIA .....              | 27 |
| Fall of Soviet Union .....              | 28 |
| Change of demands .....                 | 29 |
| Mass-housing – mass-modernization ..... | 34 |
| Case study.....                         | 36 |
| 5. FOREIGN CASES.....                   | 43 |
| Emphasis on quality of living .....     | 44 |
| Emphasis on sustainability.....         | 45 |
| Emphasis on finance .....               | 46 |
| Emphasis on image .....                 | 47 |
| Emphasis on diversification .....       | 48 |
| 6. CONCLUSIONS.....                     | 49 |
| Issues to address.....                  | 49 |
| From research to design .....           | 49 |
| 7. REFERENCES.....                      | 51 |



# 1. INTRODUCTION

*Vilnius is the capital of Lithuania and its largest city with a population of 540 000. Big part of the population still lives in post war mass-housing built in the Soviet style. These buildings and their environments do not live up to today's standards anymore in terms of parking, recreational spaces, safety, apartment size and layout, sustainability etc. They are too dilapidated for pleasant living and too good to demolish. Since country faces hard economic times there is little budget for improvement. Therefore, it seems that there is no other option than to improve what there is, gradually in a budget-neutral way. In an approach that would result in a self-sustaining built environment that is easy to maintain, friendly to the environment, energy-neutral and pleasant to live in. This sets the stage for this research paper and connected thesis design.*

## READER'S GUIDE

The 20<sup>th</sup> century was a time of great changes for the republics under Soviet regime. During the thirties, labour from country sides moved into the cities at such a rate that the fastest urban growth in recorded history took place.<sup>1</sup> After the World War II world has witnessed an exponential growth in demand for housing resulted from a rapid population growth, urbanization and the need to rebuild a large portion of the housing stock. This rapid migration required a different approach to housing design: speed and quantity became the main goals<sup>2</sup>. Furthermore, new kind of housing had to represent ideals of Soviet regime by housing a newly born idea of egalitarian communist society.

After the collapse of Soviet Union in 1990 socio-political situation has changed once again starting a wave of privatization and changing the status of Soviet mass-housing from a great solution to a great problem. Soviet mass-housing couldn't meet demands of a society which finally had a right to choose and became one of the least wanted types of housing in the market. What was a dream of most Lithuanian citizens 50 years ago – a life in modern multi-apartment building – today turned into a situation where urban blocks of mass-housing are least desirable place to live due to numerous reasons. Unattractiveness of mass housing results in a suburbanization process which also leads to problems on urban scale.

## THE PROBLEM

Buildings are aging, in many cases in need of repair. Demolition of such buildings is practically impossible since dwellings are privately owned. Hence, the modernization of mass housing neighbourhoods is one of the most talked about topics in Vilnius and other post-Soviet cities today. Now is the time, when decisions regarding this matter are being made and will be realized in huge numbers. Sadly, it seems that *modernization programme is focused on numbers rather than quality as it seeks solely for reduction of energy consumption in a cheapest possible way, though there is no overall concept of how to revitalize the residential environment, uplift living quality and adapt outdated housing to today's demands in a sustainable way.*

## RESEARCH QUESTION:

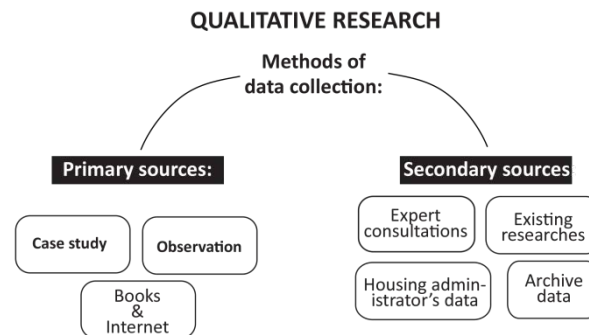
*How can mass-housing built during the Soviet Era meet today's demands through the process of housing modernization?*

## Method description

The research data are collected using mixed methods. Theoretical – descriptive part of the research is aimed on building a theoretical framework. Literature is surveyed on mass-housing in general and the more specific texts describing Soviet mass-housing and ideals behind it. To build a sufficient understanding of the technical properties of such housing gathering information in several ways was needed: from reviewing books and Internet sources to going through documents kept at the National Archive and a firm managing such housing at the selected site. Also a project manager from Vilnius Municipality was contacted for additional information regarding modernization process.

Second method used within the research is an empirical study of cases showing different levels of intervention. On the lower level research includes a few examples that were found and visited during a trip to Lithuania, showing how residents improve their dwellings by themselves. Regarding a higher level of intervention research contains an inspection of two recently renovated buildings. Inspection has been done by visiting the site, making thermal pictures and analysing these images in relation to technical renovation data. This has been done with an aim to evaluate the modernization results. Additionally, research contains an analysis of Lithuanian mass-housing modernization program, its goals and financial aspects.

Finally, last part of this research overlooks a set of recent foreign cases with a different approach to mass housing modernization. This part is intended to form a broader view of existing issues and ways to address them.



## **2. INTERNATIONAL CONTEXT**

*This chapter is aimed at overviewing international context of mass-housing in order to build a better understanding of the background in which the idea of mass-housing emerged, what were the main concepts and ideology behind it, as well as results that followed. Chapter covers a number of cases in different countries that illustrate an international mass-housing practice.*

During the 19th century, industrialization attracted masses of job-seeking people to the urban areas. Cities were not able to house these large numbers of migrants, resulting in poverty, overcrowding, poor hygiene, diseases, and other miseries. Many cities tripled or quadrupled within half a century.

In the early 1900s government support for housing emerged, but it was mainly oriented towards idealistic ideas, therefore actual implementation took some time.<sup>3</sup>

Workers' housing complex in Paris is one of the earliest public housing projects. It was built in the second half of the 19th century under Haussmann's rebuild of the city, in order to host 10,000 working class Parisians. A proletariat citadel incised by two streets, consisting of a multitude of narrow dark courtyards. Today, the Citadel is no longer that densely inhabited and its mass of interconnecting blocks has been divided to suit the Parisian real estate market better.<sup>4</sup>



**Figure 2.** Workers' housing in Paris. End of 19<sup>th</sup> century

Source: <http://www.messynessychic.com/2013/05/08/the-remains-of-a-paris-kowloon-walled-city/>



Viennese Social Democrats in 1920s launched an intensive program of social reform including the extensive re-housing of the population in almost 400 new municipal apartment complexes. Some of these buildings were huge structures that resembled fortresses for the worker families, but none of them embodied more the socialist ideology than the architectural flagship that is Karl Marx-Hof built between 1927 and 1930. Building that is over one kilometre long houses 1382 apartments as well as laundries, kindergartens, pools, stores, a clinic, pharmacy and a post office.<sup>5</sup>

Bergpolderflat built in 1934 was one of the first high-rise residential buildings in the Netherlands and the first in the use of galleries. It was intended to house labourers. Cheaper and more efficient, high-rise homes were easier to light and the ground was free for common use and greenery. Moreover, it was possible to equip the building with public services, such as a roof garden, a nursery and laundry rooms.<sup>6</sup>



**Figure 3.** Karl Marx Hof, Vienna. 1930

Source: [http://ds-lands.com/data\\_images/famous\\_places/karl-marx-hof/karl-marx-hof-06.jpg](http://ds-lands.com/data_images/famous_places/karl-marx-hof/karl-marx-hof-06.jpg)



**Figure 4.** Bergpolderflat, Rotterdam. 1934

Source: <http://en.nai.nl/>

One of the central ideas in the search for the right model for the new society was a communal way of living and dissolution of the traditional family model. New socialist housing ideas intended to transition from family nucleus to collectively living communities. Narkomfin, completed in 1932 was designed for the People's Commissariat of Finance. The building has been in a state of dilapidation for several decades now.<sup>7</sup>

Narkomfin provided inspiration to Le Corbusier's residential building called Unite d'Habitation, completed in 1952. It was designed to accommodate around 1600 residents and focused on communal living for all the inhabitants to shop, play, live, and come together in a "vertical garden city." The roof becomes a garden terrace that has a running track, a club, a kindergarten, a gym, and a shallow pool. Beside the roof, there are shops, medical facilities, and even a small hotel distributed throughout the interior of the building.<sup>8</sup>



**Figure 5.** Narkomfin, Moscow. 1932

Source: <http://thecharnelhouse.org/2013/10/05/dom-narkomfin-in-moscow-1929/#jp-carousel-12474>



**Figure 6.** Unite d'Habitation, Marseille. 1952

Source: [http://www.brutalismus.com/e/public/images/concept/01\\_corbusier\\_unite01.jpg](http://www.brutalismus.com/e/public/images/concept/01_corbusier_unite01.jpg)

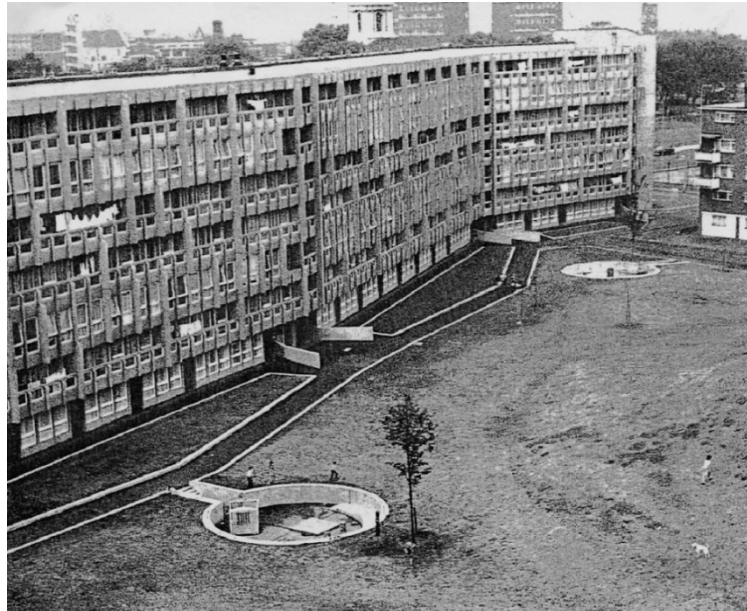
Based on the concepts of Le Corbusier Bijlmer was meant to be a utopia that separated living, work, recreation and transport. Although the concept of futuristic living, was created in the early 1960s, by the end of the 1960s of Dutch middleclass (for which the Bijlmer was developed) has changed. When the majority of the flats were finished in the early 1970s, building blocks remained almost empty. As a result, rent prices dropped and the Bijlmer started to attract the underprivileged, particularly large numbers of immigrants.<sup>9</sup>

Robin Hood Gardens is a social housing complex in East London designed by architects Alison and Peter Smithson, completed in 1972. Built from precast concrete panels and comprised of two horizontal structures with total of 213 apartments. Every third level of the buildings includes a wide concrete balcony overlooking the garden. The balconies are wide enough for multiple people to walk and for children to play. “Streets in the sky” concept was proposed by the Smithsons as a new neighbourhood street for these housing units.<sup>10</sup>



**Figure 7.** Bijlmer, Amsterdam. 1960s

Source: <http://www.uudistuvakapunki.fi/>



**Figure 8.** Robin Hood Gardens, London. 1972

Source: [http://www.blog.co.uk/community/profile\\_photo\\_sizes.php?item\\_ID=2188910&size=o](http://www.blog.co.uk/community/profile_photo_sizes.php?item_ID=2188910&size=o)



Three decades following the Second World War are often considered to be the golden age for social housing - in all European cities millions of houses were built. Many of them form housing estates that were built according to the ideas of a neighbourhood unit. In such unit houses and all services had to be within the same unit or area so that it could be flourishing on itself.<sup>11</sup>

High-rise estates in Western countries were built in a concentrated period, starting somewhere in the 1950s, and the building activity stopped rather suddenly some 10 years later. In England it stopped after a horrifying gas explosion when a section of a high-rise building built of prefabricated concrete panels collapsed earning a name of a card-house afterwards. (Fig.9) In the United States the turning point was a major failure in St. Louis (1954-1972) where newly built mass-housing block quickly became a ghetto and had to be demolished. (Fig.10) In other countries building of such housing stopped or slowed down after it became clear that the market demanded something else.<sup>12</sup>



**Figure 9.** Ronan Point, London. Explosion in 1968

Source: <http://www.highrise.eca.ed.ac.uk/>



**Figure 10.** Pruitt-Igoe, St. Louis. Demolition in 1970s

Source: <http://rustwire.com/wp-content/uploads/2011/02/Cohn01.jpg>

Johannesburg's Ponte Tower was built in 1975 as a monument to luxury and is the third tallest building in Africa. The enclosed space at the centre of the cylindrical apartment block (Fig.11) was to house shops and a dry ski slope; some of its apartments were three stories tall. But Ponte Tower fell into disrepair, and became a dirty, dangerous place as Johannesburg's moneyed classes moved away from the city centre and out to the suburbs. Change came to the building and its residents in the mid-2000s, when investors stepped in. It has received enough funding to again function as a secure home which is regaining popularity as an interesting place to live.<sup>13</sup>



**Figure 11.** Ponte Tower, Johannesburg. 1975

Source: <http://rustwire.com/wp-content/uploads/2011/02/Cohn01.jpg>



**Figure 12.** Ponte Tower, Johannesburg. 1975

Source: <http://2summers.net/2012/11/04/300th-post-the-two-towers/>

Georgian way of solving housing problem includes an element of participation. Dwellers were encouraged to build multi-storey additions to their buildings with their own money; that should have given extra floor space and increase living standard. At the same time the state would claim the results of construction into the total built floor area, pretending to reach five year plan requirements. This policy had resulted in a massive campaign of additions in late 1980s in Georgia and had a tremendous impact on the existing housing stock and in general on urban landscape all over the country. Along with disintegration of Soviet Union the process went out of the state control. The technical execution of these additions was of diverse quality, having many catastrophic consequences in the following period.<sup>14</sup>



**Figure 12.** Customized housing, Georgia. 1980s

Source: <http://urbanreactor.blogspot.nl/2012/04/post-war-housing-in-georgia.html>



**Figure 13.** Customized housing, Georgia. 1980s

Source: <http://urbanreactor.blogspot.nl/2012/04/post-war-housing-in-georgia.html>



Soviet government decided that transition to standardized mass housing projects based on rapid industrial building methods is necessary to solve the lack of housing in Lithuania. Thus, the first large-panel apartment houses were constructed in Vilnius, according to slightly altered standardized project prepared by Russian architects. Since then, the five-storey apartment house was admitted as the most cost-effective, and became a primary type of residential mass housing. Due to application of these principles amount of construction increased rapidly. During the period of 1945-1983, Vilnius urban housing stock grew almost fivefold.



**Figure 14.** Soviet mass housing, Vilnius. 1974

Source: <http://www.skyscrapercity.com/showthread.php?t=836524&page=2>



**Figure 15.** Soviet mass housing, Vilnius. 1974

Source: [http://www.niekonauso.lt/wp-content/uploads/2012/08/14-tv\\_panoramos-20120519.jpg](http://www.niekonauso.lt/wp-content/uploads/2012/08/14-tv_panoramos-20120519.jpg)

In Moscow 80% of apartments are in large concrete panel buildings, 58% of them were built from 1956 to 1985. Most of dilapidated buildings are generally five-storey blocks of apartments, built during the mid 1950s. That first generation of industrial housing was followed by improved second (mid 1960s) and, still better, third generation (1980s) of mass type housing. Due to poor maintenance and shortage of living space, about 36 per cent of Moscow's housing stock is physically or otherwise 'out of date'.<sup>15</sup>

In 1990 15 % of East German dwellings were in Plattenbau, pre-fabricated panel buildings not much different from ones in Russia and the rest of the Eastern Block. Even, if they were of a higher quality than the ones in the Soviet Union and inhabitants were generally happy with their homes, a great contrast with the Western neighbours and quickly increasing standard of living made Plattenbau detested and only regarded as a symbol of the hated system. Currently Eastern part of Germany has a large rate of apartment vacancy at 15 %, great majority of them in Plattenbau.<sup>16</sup>



**Figure 16.** 1<sup>st</sup> gen. Soviet mass housing, Moscow. 1950s-1960s

Source: <http://www.aerorecord.ru/images/photo/113.jpg>



**Figure 17.** Marzahn plattenbau, Berlin. 1980s

Source: [http://www.fotos-aus-der-luft.de/Berlin/Marzahn-Hellersdorf\\_03.html?g2\\_imageViewsIndex=2](http://www.fotos-aus-der-luft.de/Berlin/Marzahn-Hellersdorf_03.html?g2_imageViewsIndex=2)



The vast majority of public housing projects in Hong Kong consist of high-rise buildings. Recent buildings usually contain 40 or more storeys. Today about half the people in Hong Kong live in welfare housing which due to high population and land prices is a usual place to live.<sup>17</sup>

China is planning to move 250 million people from the countryside to cities in the next 20 years. But this massive, unprecedented demand has been distorted by a number of factors unique to China. Flawed financial incentives along with the poor phasing of services, amenities, and jobs create most of the problems. In addition, China's emerging middle class tends to invest in real estate, so people often buy apartments in incomplete communities but don't move in, expecting that values will rise, or that they will live there someday. The result is a string of large, empty developments that remain speculative investments rather than real homes and communities. Since there is no property tax it is easy to hold empty apartments.<sup>18</sup>



**Figure 18.** Mass housing, Hong Kong

Source: [http://upload.wikimedia.org/wikipedia/commons/c/c3/Kin\\_Ming\\_Estate.jpg](http://upload.wikimedia.org/wikipedia/commons/c/c3/Kin_Ming_Estate.jpg)



**Figure 19.** Mass housing, China

Source: <http://www.mwestonchapman.com/wp-content/uploads/2013/06/Ordos-vacancy-signs.jpg>



### 3. MASS-HOUSING IN SOVIET UNION

*This chapter describes properties of Soviet mass-housing as well as causes behind them. Newly developed construction methods enabled to build low price housing in huge numbers in this way providing home for many people who were moving or being relocated from villages into the cities. At that time building's adaptability or flexibility in the future were not considered, therefore construction methods used, even being very efficient, created mass of outdated housing that is very difficult to renew. For this reason a large part of the housing stock is still in the same state as it was decades ago, even though user requirements have changed.*

## **Policy**

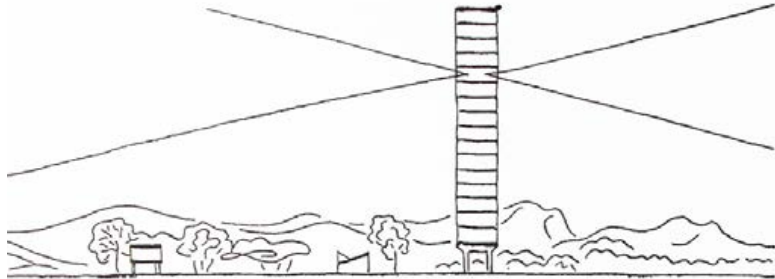
In the former Soviet Union state housing policy was not only a socio-economical tool to deal with housing shortage under the process of rapid industrialization, but also a political tool to consolidate the regime and form an egalitarian communist society. Mass-housing should have been home for a wide range of people, from workers of a lowest chain to executives. It did not work completely in the way utopian communist ideas suggested. There were possibilities to form cooperatives and build clusters for the “more equal” ones in a supposedly equal society. In addition, less than modest dachas confronted the idea of egalitarian society as well.<sup>19</sup> Furthermore, buildings built before communist invasion were nationalized and in case of a good location and quality - given to party members. Meanwhile actual owners were moved out, quite often sent to Siberia or put out of the way in other ways. These kinds of housing were a privilege of the party members of a higher rank. While the vast majority of citizens had to wait in a line for an apartment to be assigned to them and didn't have much of a choice since salaries in state enterprises were low and there was no private property that could be bought.

## **Utopia**

The fact that city projects were a secondary element in the industrialization program in the Soviet Union, together with the lack of experience, serious material shortages and the theoretical problems of not knowing what exactly the new socialist city should be, gave birth to various ideas which often seemed to lose contact with reality.<sup>20</sup>

Most of the urbanistic visions took place in the pre-Stalin era. Under Stalin, urban planning entered a dark age when modernist design was forbidden. But late 1950s was a time of relative intellectual openness and socialist renewal in the USSR, initiated by Khrushchev's 1956 condemnation of Stalin's tyranny. It was in the climate of the Khrushchev Thaw that Gutnov and his colleagues set about to create what architectural critic James Mayo called “a concrete spatial agenda for Marxism”.<sup>21</sup> In the late 1950s, a group of Moscow University

intellectuals led by Alexei Gutnov wrote *The Ideal Communist City*. This book together with unrealistic utopian ideas also presented a set of ideas which reflection can actually be seen in the mass-housing program. He determined rules under which mass-housing should be designed: size of rooms and apartments corresponding to the new type of educational and economic systems; building typology and density; necessity of direct connection with greenery; importance of bilateral orientation and so on. Some of the rules seem to be applied and some don't, such as the two-sided orientation (Fig.20) - most likely due to being too idealistic or not rational enough.



**Figure 20.** Bilateral orientation.

Source: A. Gutnov, 1970

## Pollution

Even though pollution from vehicles in Soviet Union was relatively low, there were many other environmental issues, such as pollution from power plants and factories. Available funds were not sufficient to spend on air and sewage treatment and controls as well as most probably pollution was not seen as a major issue. Premiums for the Soviet plant managers depended almost entirely on increased production or sales. As installation of pollution control devices may reduce production, therefore environmental problems were not the ones to address and production of environmental control devices was not a part of Soviet industry.<sup>22</sup> This resulted in a non-healthy living environment in those days, and in most cases those areas are still

polluted today, even though factories are not functioning any more. In most cases soil is polluted with oil products and heavy metals, such as zinc, lead, tin, silver and other that were used by many industries. Luckily, top layers of soil may be removed - this kind of procedure has been done in numerous refurbishment projects. During this research there were no data found indicating that residential buildings themselves would be hazardous to inhabitants' health.

## **Construction**

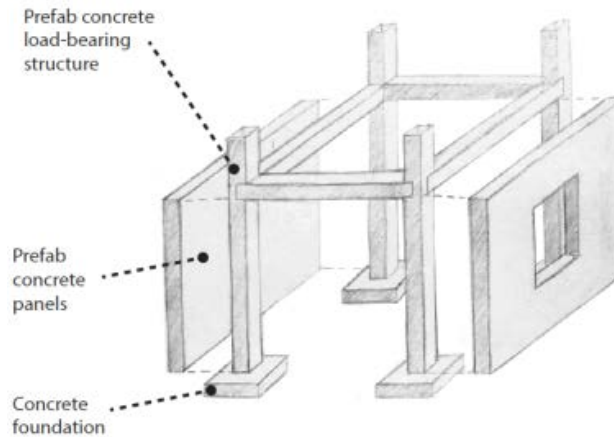
Mass-housing that was available for the majority, and especially the one built next to factories, was not the nicest place to live, mainly due to the size of housing units and poor building quality. Explanation for the low quality of exterior and interior finishing is the control of housing finance, as industries did not want to spend too much money on what was not their primary job. Industry's primary goals were speed and getting a roof over the workers' heads so that the new plants can be constructed. Furthermore, workers were not in a position to bargain for housing quality since they had to go through long waiting lists to get an apartment. Consequently, because of this natural monopoly there was no stimulus for competing for higher quality.<sup>23</sup>

Soviet architects adapted and developed various technologies attempting to reduce costs and completion time. The earliest material used was brick. Even though production of silicate bricks enabled reaching lower price and bigger numbers but it was still too complicated, too expensive and too slow.

Mass-housing program had to be based on the construction of the most cost-effective, standardized buildings. On Khrushchev's initiative, experts were sent to France to study the pre-cast systems and to acquire the Camus system patented by the French engineer R. Camus in 1948.<sup>24</sup> Later new building methods from prefabricated concrete panels were developed.

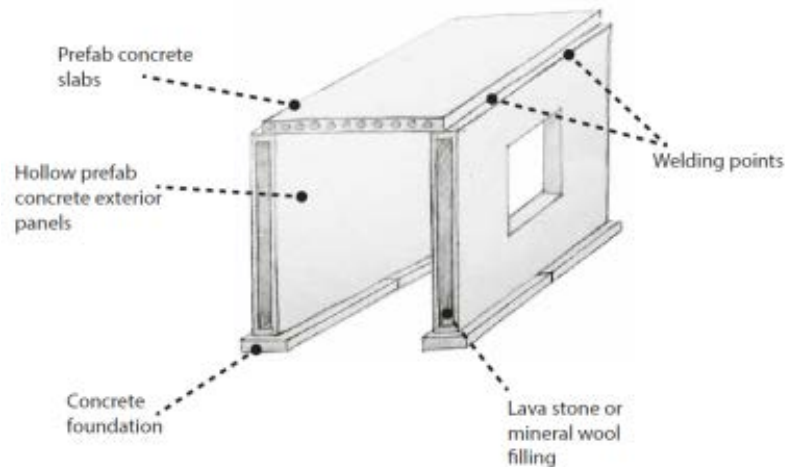
Main structural typologies were the following:

1. Precast load-bearing concrete structure assembled in situ to which solid panels of precast concrete were attached – a technology developed in the fifties. Probably the least successful typology, since this kind of structure was least stable. Even though buildings of this type were built in huge numbers - there are very few of them still standing today. (Fig.21)



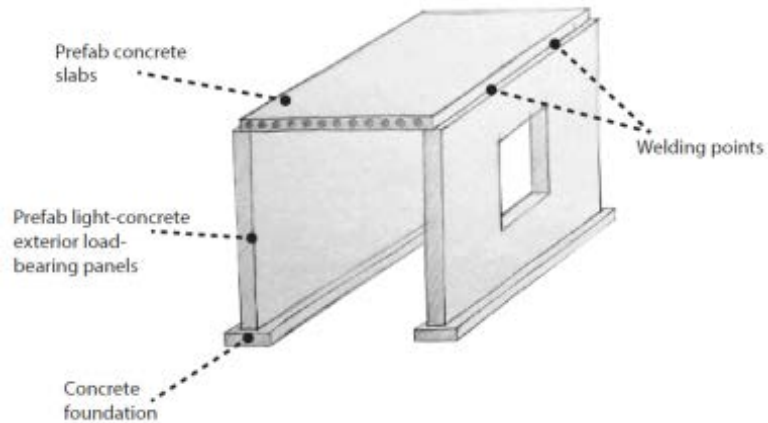
**Figure 21.** Load-bearing carcass .  
Source: author

2. One more type of prefabricated housing was built of load-bearing large concrete panels that in order to create a rigid structure were joined together by welding reinforced bars and pre-installed metal plates on several points of the perimeter. Exterior panels were hollow, filled with insulating material, such as lava stone or later on - mineral wool. Fabrication of such panels was quite complicated; as a result it wasn't the most popular type of panels. (Fig.22)



**Figure 22.** Hollow load-bearing panels.  
Source: author

3. Probably the most popular system, which reached its peak in seventies, was also based on load-bearing large concrete panels that were welded together, but exterior panels as well as interior ones were not hollow. To reach bigger thermal resistance lava stone was mixed into the concrete instead of being a separate layer in the panel. (Fig.23)



**Figure 23.** Load-bearing panels.

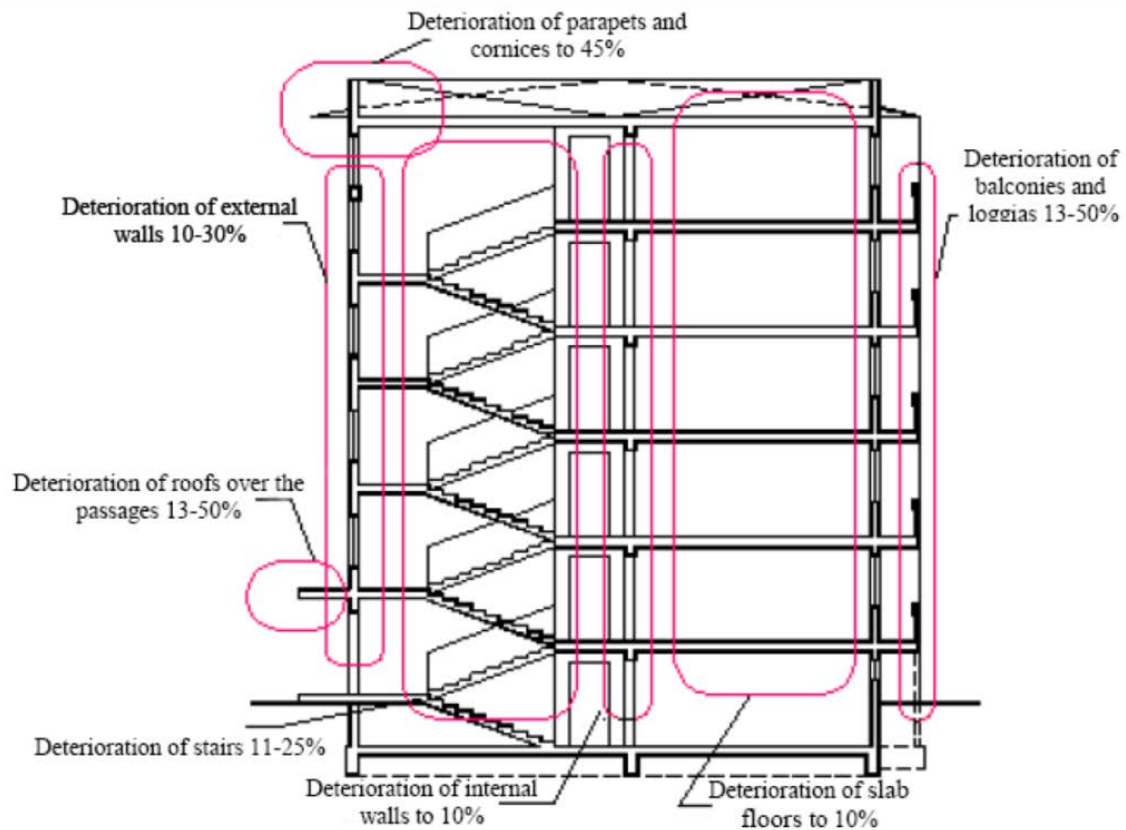
Source: author

### Life span

Theoretically, calculated service life span of load-bearing structures of concrete large panel houses is 125 years<sup>25</sup>, and according to Russian sources – around 150 years when renovated. In addition, lead-bearing structure is built with a reserve, meaning that additional load may be added<sup>26</sup>.

Many other building elements, such as roof covering, balconies, cornices, parapets, joints between panels, surface finishing and staircases, have a relatively short life span and should be replaced. (Fig.24) Nevertheless, according to this data most of those buildings can be safely used for at least 100 more years, making modernization of such buildings a logical step to take.





**Figure 24.** Deterioration of building elements  
Source: Č. Ignatavičius et al.

## Economy of Scale

Even though mass-housing related issues are similar and evident in many countries, in post-Soviet bloc the problem is of a whole different scale. To compare:

- 413 mln. people live in Western Europe of which 6 mln. live in mass-housing (1,5%)<sup>27</sup>
- 293 mln. people live in former USSR states of which 34 mln. live in mass-housing (11,5%)

Not only the total number of people living in mass-housing in post-Soviet bloc is bigger, but also the percentage of population living in such housing is much higher. Nevertheless, West European countries have started working on adapting mass-housing to today's demands already a few decades ago, while Eastern countries are just starting to address those issues.

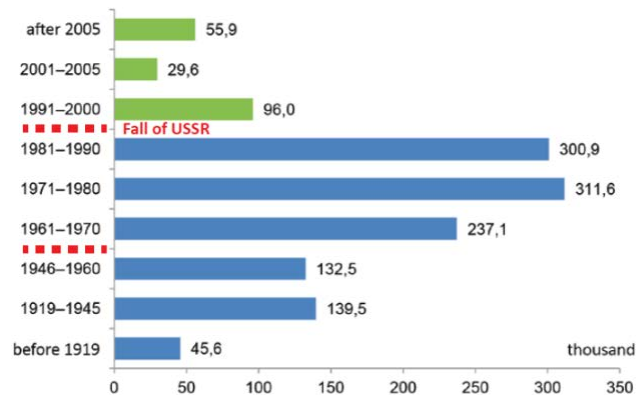
Quantity of these buildings suggests seeking for a less drastic and more sustainable approach to the issue than demolition of existing buildings. Due to adaptation of standardized construction methods Soviet planners were able to build mass-housing in very high numbers. Today many countries are facing mass-housing related issues; nevertheless, these issues are exceptionally relevant in Lithuania, since even today two thirds of the population still live in those grey standardized neighbourhoods.<sup>28</sup> Knowing the scale and urgency of the problem it makes it a very relevant and important topic to address.

## 4. CASE OF LITHUANIA

*This chapter overlooks the situation in the field of mass-housing after the collapse of Soviet Union. As an introduction to the Lithuanian case, a summary of how housing privatization was carried out is presented, which is an important aspect that shows how most of the housing stock became privately owned. This is then followed by a set of examples of small scale DIY solutions as an illustration of changing resident's demands. Afterwards, summary of housing modernization programme is given, indicating main modernization goals and States position towards the process. Lastly, results of an inspection of how mass-housing modernization is actually being implemented are introduced.*

## Fall of Soviet Union

In Lithuania construction of large panel housing declined tremendously after the fall of USSR, even though low numbers of such housing were still being built up to year 2000. (Fig.25)



**Figure 25.** Housing units built in a period of time

Source: author

Economies of post-soviet countries went through a rapid change from planned to market economy. Ownership of most of the state property, including housing, was transferred to people by the process of mass-privatization. Mass-privatization in Lithuania started in 1991, right after the declaration of independency.

1991 – 1995 – privatization by vouchers<sup>29</sup>. Vouchers were issued to all residents by the State, amount of vouchers (1-5000 per person) depended on resident's age. That should have enabled citizens to participate in the privatization of the state, to become owners and to ensure social justice. Each person had to have equal rights in privatization process<sup>30</sup>. Property could have been bought for vouchers + cash. Only up to 5% of the price had to be covered in cash while buying stocks; in case of buying apartments – no less than 20%. Most of people used vouchers to buy apartments and sold the

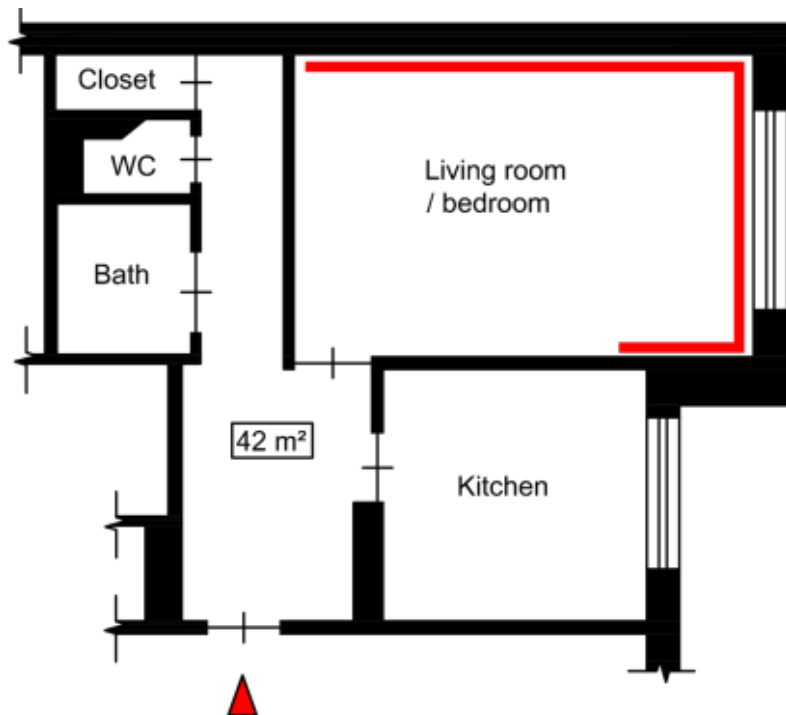
remaining vouchers as there wasn't much information of investment possibilities. Meanwhile others bought these vouchers for very low prices and bought stocks instead, in this way becoming owners of land lots and factories<sup>31</sup>.

Main goal of privatization was to rapidly develop private sector, liquidate ineffective State monopoly and provide necessary conditions for market economy to evolve. When privatization for cash started in 1996 more goals emerged, such as: attracting foreign capital and technologies; making state-owned enterprises profitable by privatizing them; getting more funds to reduce State deficit and initiate investment programs; reducing State administrative functions<sup>32</sup>.

### **Change of demands**

In this research different levels of mass-housing related issues and processes were looked into. On the lowest scale there are private initiatives to upgrade or adapt apartment units to today's demands. As the housing became privately owned two decades ago residents felt a certain amount of responsibility towards their property and became more willing to invest time and money into it. Below a few examples of such small scale initiatives are presented.

Since most of the buildings built from concrete panels were not insulated, people quite often insulate their apartments from the inside by themselves. In this example owner of an apartment located in the top floor of the building insulated ceiling and exterior walls from the inside. Accord to the owner, adding a few centimetres of insulation made the living room a bit warmer during the winter and less hot in the summer, as well as partially solved the issue of mould growth in the corners caused by condensation on cold concrete surface and moisture trapped in between blocks. (Fig.26-27)



**Figure 27.** Insulated walls. Floor plan  
Source: author

Second example illustrates quite a common though illegal way to improve an apartment. Opening in a concrete façade panel is enlarged by cutting out a part under the window and relocating radiators. In this way living room merges together with a glazed balcony together forming a bigger living room. (Fig.28-29) Nevertheless, there is a possibility that such interventions if executed in higher numbers could affect the overall stability of a building, therefore load-bearing structure should be thoroughly examined and strengthened if necessary.



**Figure 28.** Room extension. Interior  
Source: author



**Figure 29.** Room extension.  
Source: author

Third example is similar to the previous one, but in this case owner of the apartment went further. Not only the façade panel was modified but also some balcony elements were removed adding a bigger glazing instead. Furthermore, heating system was modified by relocating and possibly enlarging radiators to heat up a bigger space, in this way using more heat than neighbours but paying the same tax – same situation as in the previous example. But in this case illegal modifications were clearly visible from the outside, therefore unhappy and possibly jealous neighbours reported it to the controlling institution. As a result, owner of the apartment was fined for unauthorized change of façade elements and was obliged to redo everything to the original state in a few months<sup>33</sup>. (Fig.30-31)



**Figure 30.** Room extension & removed façade elements

Source: <http://www.delfi.lt/verslas/nekilnojamas-turtas/ispletus-buta-kelias-kvadratiniais-metrais-nelauktas-konfliktas.d?id=63010922>



**Figure 31.** Room extension & removed façade elements

Source: author



Fourth example illustrates how living quality can be improved noticeably without obeying the law, if owner of the apartment has some extra money. Story behind this project is clear – apartment simply became too small for a four person family; therefore options of moving out to a bigger place were considered. Nevertheless, building was in a good location - close to the city centre and a park, therefore changing location was not the most preferred option. Luckily neighbour was selling his apartment at that time and a decision was made to buy it and join two apartments into one. To do that an additional opening had to be made in a load bearing wall. As a result larger kitchen with a dining zone were created, living room was separated from it by a folding door, therefore when needed, it could easily form a big open space with a bilateral orientation for the family to spend time together. Even though owner of the apartment is happy with the result, there is still one issue that was not solved in this project - that is poor sound isolation.

Despite the fact that today it is used as one apartment, it is

still registered as two. When children move out, their parents will probably not need that much space anymore and they will be free to sell one of the apartments and make it more suitable for two again. (Fig.32-33)



**Figure 32.** Joined apartments. Folding partition between dining zone and living room  
Source: author



**Figure 33.** Joined apartments. Symmetry axis  
Source: author

## **Mass-housing – mass-modernization**

Lithuania became EU member in 2004. A few years later mass-housing modernization program was launched with its goals to meet EU directives, renew existing housing stock and become less dependent on energy sources from the East.

### **FINANCING**

From the start of 2014, State supports modernization program by covering 40% of modernization expenses in case energy efficiency class C is reached (before 2014 goal was class D) and energy consumption is reduced by at least 40%. No additional funding is available for reaching higher energy efficiency class. Remaining 60% percent of expenses are covered by residents themselves. Bank loan is usually given for up to 20 years, with an interest rate of 3% per year.

Financial support is available for:

#### Means of saving energy

1. Reconstruction of heating, hot and cold water systems
2. Replacement of windows and outside doors
3. Roof insulation, including pitched roof construction (construction of new attic spaces not included)
4. Glazing of balconies (loggias) following a general project
5. Exterior wall insulation
6. Insulation of slab above cellar
7. Plinth insulation
8. Alternative energy source installation (sun, wind...)
9. Reconstruction of elevators

#### Other means of modernization

10. Reconstruction or replacement of common use systems, such as: waste water, electric installation, fire safety, ventilation.<sup>34</sup>

## TYPICAL PROJECTS

Whether to initiate a modernization project or not is up to residents of the building. Modernization cannot be started without an approval of residents. Project preparation process as well as renovation itself is partly subsidized by the State. In case there is already a typical project prepared for the particular type of housing but residents are willing to change it - only 2% of project's preparation costs are covered by the State.

## EU REGULATIONS

### EU Directive 2010/31:

- from 2018 public buildings and from 2020 all new buildings have to be close to zero energy

Building reglamentation:

- B, A, A+ energy efficiency class - low energy consumption
- A++energy efficiency class - close to zero energy<sup>35</sup>

### Current renovation results:

- class C-B, around 40% less energy needed.

These numbers raise a question - what is the actual lifespan of such housing modernization? Knowing that from 2020, according to EU regulations, all new buildings will have to have A++ label, then why to modernize a building in a way which will be outdated in less than 6 years?

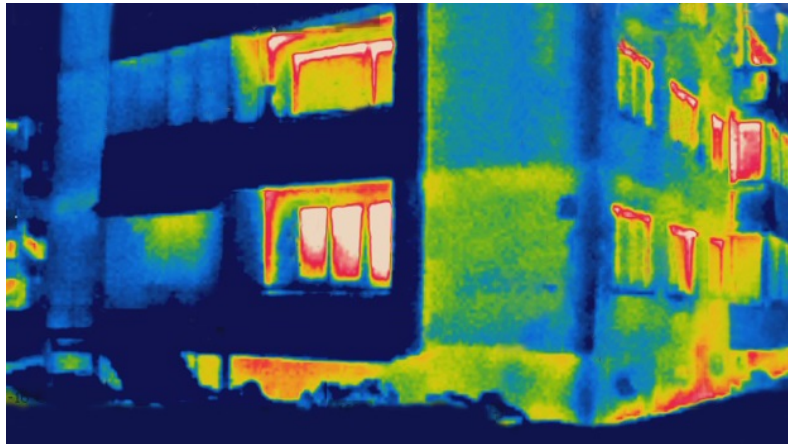
## Case study

In order to determine what the shortcomings of a typical modernization project are, an inspection of buildings that have been recently modernized in Vilnius was done.

### INSULATION

Clearly, roof and façade insulation is an essential part of modernization that seeks to reduce energy consumption and to protect load-bearing structure from atmospheric effects. Other steps taken to prevent heat loss through the façade are replacing windows and doors, as well as converting balconies into loggias. I used a thermal camera to point out how such changes improve thermal properties of a building and if any flaws can be noticed.

In a thermal photograph it is visible that uninsulated buildings lose enormous amount of heat through their façades. (Fig.34)



**Figure 34.** Uninsulated facade

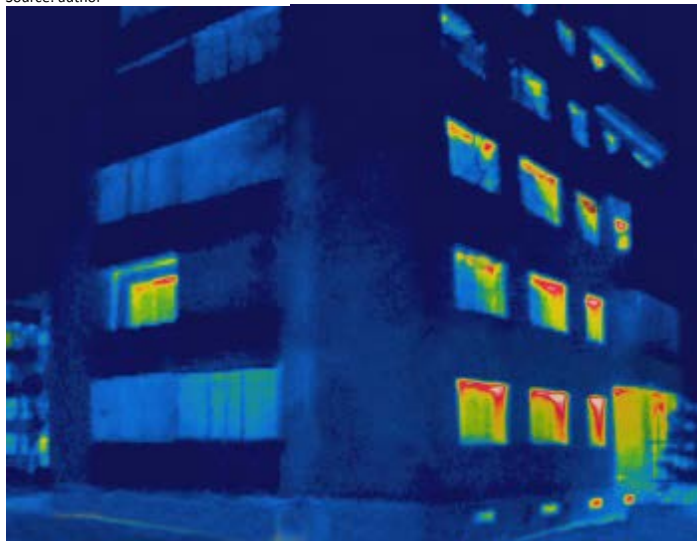
Source: author

Insulated exterior walls of a modernized building have a greatly improved thermal resistance. (Fig.35-36) On the other hand, it is visible, that not all façade elements were replaced – in this case door to the cellar has a very low thermal resistance. (Fig.37)



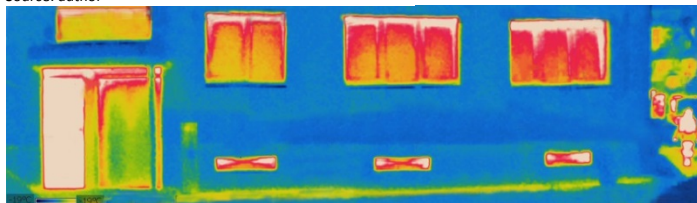
**Figure 35.**

Source: author



**Figure 36.**

Source: author



**Figure 37.**

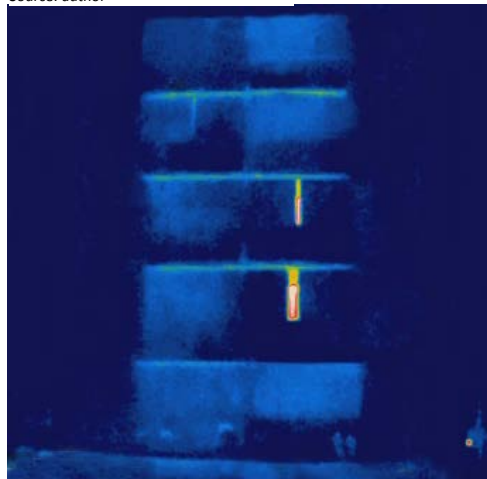
Source: author

Turning balconies into loggias is not only a good way to improve thermal resistance of the façade but it is also a necessity since old balconies are often in a very poor state. In this case old balconies were replaced with new glazed ones. (Fig.38) Even though this kind of façade is well insulated, there are several thermal bridges left. For example - balcony slabs. (Fig.39-40)



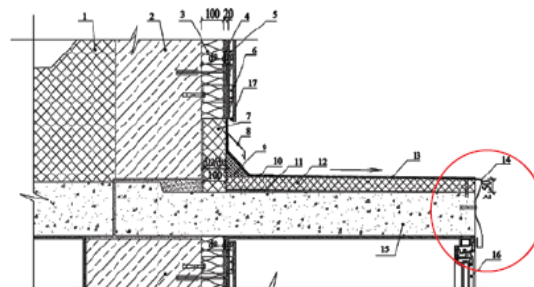
**Figure 38.**

Source: author



**Figure 39.**

Source: author

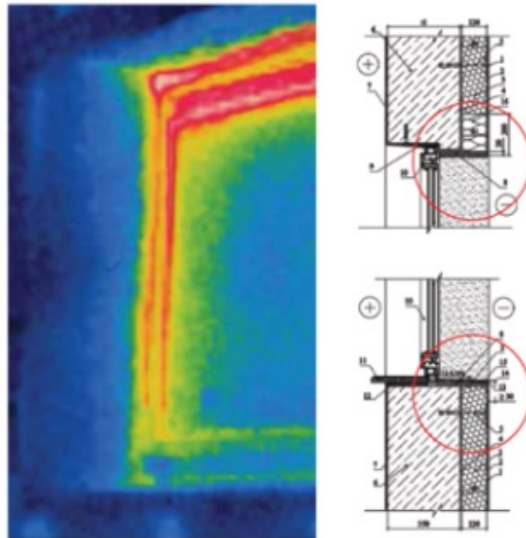


**Figure 40.**

Source: author

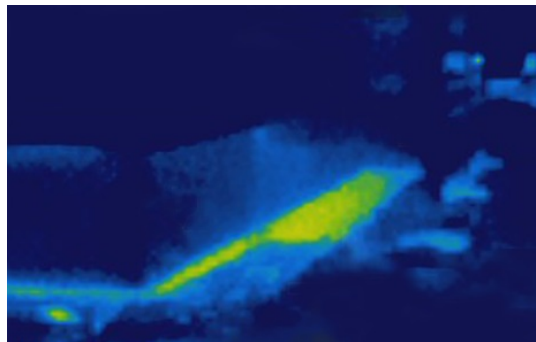


Other details, such as plinth and window sills, should also be reconsidered. Since windows are placed to their default position instead of the insulation layer, there is a thermal bridge by the sills. (Fig.40-41). Also additional heat loss is noticeable at the ground level as the insulation of plinth is not deep enough. (Fig.42-43).



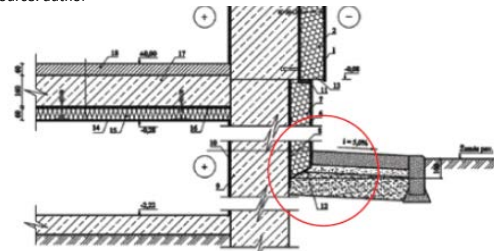
**Figure 40-41.**

Source: author



**Figure 42.**

Source: author



**Figure 43.**

Source: author

## AIR QUALITY

Air quality within apartment is one of the most important aspects of ensuring good living conditions. Nevertheless, housing modernization results are not that pleasing when it comes to air quality.

Exterior walls of such buildings have many cracks and gaps in between concrete panels which allow moisture to enter and collect within buildings' load-bearing envelope. When an insulation layer is glued to the façade moisture is being trapped within a wall and becomes a suitable environment for mold to grow. It gets even worse when residents decide to save on new windows, buying ones without micro ventilation option. According to Vilnius Planning Department's member S. Dagelienė, shafts of natural ventilation in those buildings are working fine while exhausting air, but problems occur when there is no inlet of fresh air. When old wooden windows are replaced by air tight plastic ones issues of draft in the apartment become solved, but at the same time air quality drops due to an absence of ventilation. Thus the survey results:

- before modernization 33% of residents were not satisfied with interior air quality
- after modernization 46% of residents were not satisfied with interior air quality<sup>36</sup>



## SURROUNDINGS

While attention of modernization program is focused on buildings and energy bills it neglects the surrounding space and living quality in such housing in general. Even after building has been modernized nothing has been changed within the surrounding space: lack of parking spaces, no bicycle infrastructure, poor shape of paving, underused green spaces. (Fig.44-45) These problems are tightly connected with the fact that issue of control absence in such neighbourhoods is not addressed. All of these buildings are surrounded by semi-public non-divided space; therefore residents do not feel any responsibility after it and municipality does not have the required resources.



**Figure 44.** Underdeveloped spaces in between buildings  
Source: author



**Figure 45.** Underdeveloped spaces in between buildings  
Source: author



## 5. FOREIGN CASES

*Following chapter illustrates how mass-housing related issues are being solved abroad. Each example shows a different approach to housing modernization which also leads to different results. Each approach has its own strengths and weaknesses but together they give a good insight of what are common issues and in what ways it could be dealt with.*

**Emphasis on quality of living**  
2006-2010, Halle-Neustadt  
and Leinefelde, Germany

Mass-housing renewal projects by Stefan Forster Architekten are very different from Lithuanian examples as it is a complete refurbishment rather than modernization. Since buildings were partly vacant and not privatized, architect had more freedom reshaping them. The goal was not only to reduce energy consumption, but first of all, to make it an attractive place to live. Buildings were partly disassembled to reduce height and to add volumetric diversity, more windows and terraces were provided (Fig.46-47), apartments' layouts changed, balconies enlarged, outdoor spaces redefined (Fig.48). All of these improvements lead to a great result – neighbourhood became more diverse and buildings became fully occupied again<sup>37</sup>.



**Figure 46.** Before refurbishment  
Source: <http://www.stefan-forster-architekten.de/>



**Figure 47.** After refurbishment  
Source: <http://www.stefan-forster-architekten.de/>

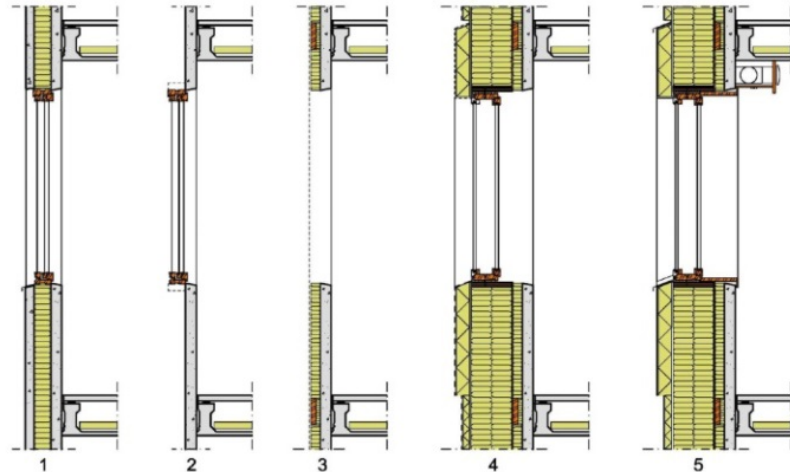


**Figure 48.** Outdoor  
Source: <http://www.stefan-forster-architekten.de/>

**Emphasis on sustainability**  
2012, Riihimäki, Finland

A retrofit project in Riihimäki adapts prefabricated façade element technology (TES) developed by Aalto University (Finland), NTNU (Norway) and TU Munich (Germany). It is oriented towards reducing the amount of on-site work as well as making refurbishment process faster, more efficient and more sustainable. Old façade sandwich panels are stripped down removing their outer layer and old insulation, afterwards new layer of prefabricated panels are attached. (Fig.50) These new panels are made out of wood, filled with an insulating material and have ventilation shafts and new windows installed. (Fig.49) As soon as panels are attached, a new wooden roof construction is added. This extra space is necessary to house heat exchangers and other ventilation equipment. (Fig.51)

As a result of such a technological approach retrofitted building meets the requirements of a passive house definition. Nevertheless, its appearance did not change very noticeably and housing quality was not improved that much except for the interior air quality<sup>38</sup>.



**Figure 49.** Façade refurbishment stages  
Source: K. Lylykangas



**Figure 50.** Attaching prefab. panels  
Source: <http://www.ttu.ee/>



**Figure 51.** Wooden frame filled with rock wool and ventilation shafts  
Source: <http://www.ttu.ee/>



### Emphasis on finance

From 2004, Belarus and Russia

Approach to housing modernization in these countries is different from the European practice mainly due to financial issues, such as the need to use expensive land as efficiently as possible as well as the need to reduce financial burden falling on residents. This leads to extraordinary decisions, like adding additional floors to existing buildings. Since these buildings can handle up to two additional floors without strengthening their load-bearing structure or foundation<sup>39</sup>. (Fig.52)

In a year 2013 a project in Moscow was granted and got a permission to build five extra floors (Fig.53) on an existing residential building, in this way covering building modernization costs for residents. In this case elevators and additional load bearing structure are added.<sup>40</sup>



**Figure 52.** Two additional floors

Source: <http://townplanner.livejournal.com/4042.html>



**Figure 53.** Five additional floors

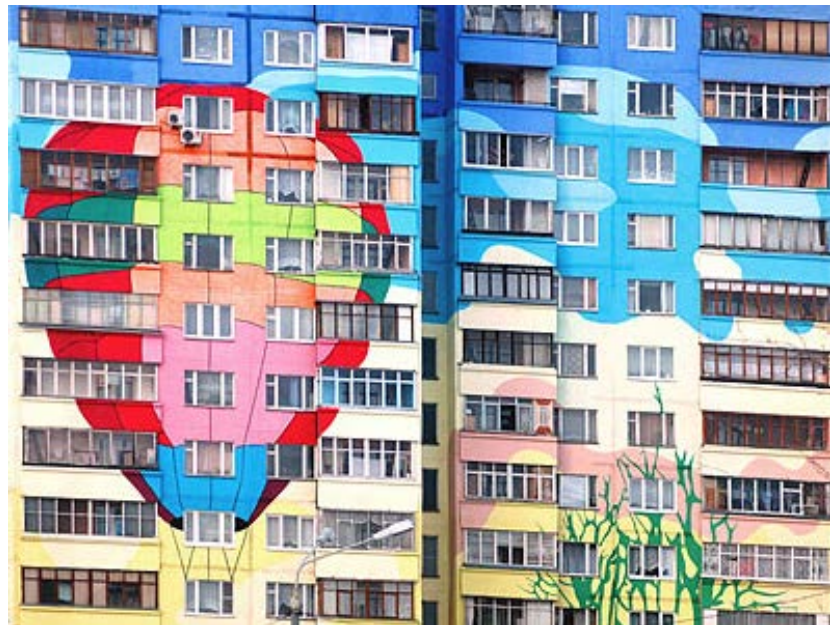
Source: <http://reality.rbc.ru/articles/22/08/2013/562949988618502.shtml>.

**Emphasis on image**  
2006, Moscow, Russia

This example illustrates an attempt to solve social issues of mass-housing neighbourhoods by simply repainting facades<sup>41</sup>. (Fig.54-55) It is hard to say if such approach is an answer to any social problems that may emerge in mass-housing quarters. Despite that, in my view, it brings about a different message – why invest into housing which is not worth much? In this case buildings are located in a distant suburb of Moscow where housing demands and prices are far lower compared to Moscow city. Maybe in such areas it is more rational to simply protect load-bearing structures from atmospheric effects without investing too much? On the other hand, mass-housing located in a city centre might be a good place to invest.



**Figure 54.** Colorful facades  
Source: <http://englishrussia.com/2006/12/23/real-urban-art/>



**Figure 55.** Colorful facades  
Source: <http://englishrussia.com/2006/12/23/real-urban-art/>

### Emphasis on diversification

1995, Amsterdam,  
Bijlmermeer, The Netherlands

In this case refurbishing was not an option and a partial demolition was seen as the only solution. Within the renewal area the number of original high-rises has been reduced from 95 to 45 per cent. (Fig.56-57) In an attempt to lure the middle-classes back into the Bijlmer area, the flats have been replaced by single-family dwellings with gardens<sup>42</sup>. (Fig.58)



**Figure 56.** Demolished buildings  
Source: <http://failedarchitecture.com/>



**Figure 57.** New buildings  
Source: <http://failedarchitecture.com/>



**Figure 58.** New housing typology  
Source: <http://failedarchitecture.com/>



## 6. CONCLUSIONS

### Issues to address

The need to embrace new demands and possibilities that emerged in the 20th century lead architects and politics to a variety of exceptional designs and theories regarding future housing. Mass-housing was a breakthrough in solving issues of cramped and overcrowded cities. Nevertheless, in many countries mass-housing has recently become a problem rather than a solution. Due to cheap and fast building methods various technical problems now have occurred and have to be dealt with, such as poor building quality, poor insulation and overall deterioration. Since buildings were designed for a different kind of user there are many issues related to internal design, like small rooms, small windows, no room for modern equipment and outdated plans in general.

But problems are not only related to buildings but also to urban design. Even though usually there are enough of green spaces around but quite often those spaces are underused due to legislation issues, since the responsibility for public spaces is unclear. Also lack of parking space, lack of diversity, concentration of elderly and poor people adds up to a negative image of a neighbourhood. Antisocial behaviour in such housing blocks is also usually one of the major issues as those buildings were designed for a different, sometimes utopian, society. But in the end, the most problematic part is modernization costs. Financial burden of modernization is most likely to fall on dwellers since mass-housing fails to become an interesting object for investment.

### From research to design

Looking back at the question raised at the beginning of the research - *How can mass-housing built during the Soviet Era meet today's demands through the process of housing modernization* - it is clear, that answer should include many different aspects. Even though Soviet mass-housing projects were replicated through the whole former USSR

territory in huge numbers and look alike, there is no single solution that would fit every location. Demands are different everywhere depending on socio-cultural situation, price of land, level of prosperity and many other variables. Therefore in my view, mass-housing issues should not be attempted to be resolved by applying stubborn mass-modernization principles. Due to uniformity and big numbers mass housing could be treated as a grey shapeless mass which is yet to be designed into a functional urban form enhancing specificity of different locations. A set of possibilities and variations on different scales should be available in order to meet diverse demands and solve manifold issues related to mass-housing from urban strategy level to group of buildings and even a single cell. Knowing the complicated economic situation it is of a high importance that modernization projects are as self-sustaining as possible in terms of both budget and energy.

Within the research collected technical data as well as categorized foreign cases and common issues to address builds a framework under which the thesis design is developed.

## 7. REFERENCES

- <sup>1</sup> Michael Hamm, "The Modern Russian City: An Historical Analysis," *Journal of Urban History* 4 (1977): 53.
- <sup>2</sup> Webmaster and Cecilia Appelgren, "- Blekinge Institute of Technology - in Real Life," accessed April 13, 2014, <http://www.bth.se/eng/newsarticles.nsf/pages/8329cd6e9799df40c1257c46005460ea?OpenDocument>.
- <sup>3</sup> F. Wassenberg, *Large Housing Estates: Ideas, Rise, Fall and Recovery: The Bijlmermeer and beyond* (Delft: IOS Press, 2013), 29.
- <sup>4</sup> "The Remains of a Paris 'Kowloon' Walled City," *Messy Nessy Chic*, accessed May 12, 2014, <http://www.messynessychic.com/2013/05/08/the-remains-of-a-paris-kowloon-walled-city/>.
- <sup>5</sup> "The Karl Marx-Hof, Vienna," accessed May 12, 2014, <http://www.viennadirect.com/sights/marx.php>.
- <sup>6</sup> "Architecture in Rotterdam | Bergpolderflat," accessed May 13, 2014, <http://www.architectuurinrotterdam.nl/building.php?buildingid=248&lang=en&PHPSESSID=b7652d4a5fb2221d2939ec8aaca3ec57>.
- <sup>7</sup> "Constructivist Utopia Narkomfin Endangered by Renovation Project | Arts and Ideas," *The Moscow Times*, accessed May 13, 2014, [http://www.themoscowtimes.com/arts\\_n\\_ideas/article/constructivist-utopia-narkomfin-endangered-by-renovation-project/497952.html](http://www.themoscowtimes.com/arts_n_ideas/article/constructivist-utopia-narkomfin-endangered-by-renovation-project/497952.html).
- <sup>8</sup> "AD Classics: Unite D' Habitation / Le Corbusier," *ArchDaily*, accessed May 13, 2014, <http://www.archdaily.com/85971/ad-classics-unite-d-habitation-le-corbusier/>.
- <sup>9</sup> 4 Days Ago Via Web, "The Bijlmer: A Dutch Approach to Multiculturalism by Boudewijn Sterk, Selma Zahirovic," *Humanity In Action*, accessed May 13, 2014, <http://www.humanityinaction.org/knowledgebase/153-the-bijlmer-a-dutch-approach-to-multiculturalism>.
- <sup>10</sup> "AD Classics: Robin Hood Gardens / Alison and Peter Smithson," *ArchDaily*, accessed May 13, 2014, <http://www.archdaily.com/150629/ad-classics-robin-hood-gardens-alison-and-peter-smithson/>.
- <sup>11</sup> Wassenberg, *Large Housing Estates*, 30.
- <sup>12</sup> Ibid., 31.
- <sup>13</sup> "Africa's Tallest Apartment Building Was Built for Luxury but Filled with Garbage," *The Verge*, accessed May 13, 2014, <http://www.theverge.com/2013/11/4/5063258/ponte-tower-africas-tallest-apartment-filled-garbage-film>.
- <sup>14</sup> lebu, "URBAN REACTOR: Post War Housing in Georgia," accessed May 13, 2014, <http://urbanreactor.blogspot.nl/2012/04/post-war-housing-in-georgia.html>.
- <sup>15</sup> "Moscow," accessed May 13, 2014, [http://www.ucl.ac.uk/dpu-projects/Global\\_Report/cities/moscow.htm](http://www.ucl.ac.uk/dpu-projects/Global_Report/cities/moscow.htm).
- <sup>16</sup> "Finding Marzahn | Finding Berlin," accessed May 13, 2014, <http://www.findingberlin.com/so-youve-already-heard-about-marzahn/>.
- <sup>17</sup> "Is Hong Kong's Subsidized Housing Fair?," *CNBC.com*, accessed May 13, 2014, <http://www.cnn.com/id/47640064>.

- 
- <sup>18</sup> “How to Bring China’s Ghost Towns Back to Life,” *ArchDaily*, accessed May 13, 2014, <http://www.archdaily.com/425651/how-to-bring-china-s-ghost-towns-back-to-life/>.
- <sup>19</sup> Bater, *The Soviet City*, 165.
- <sup>20</sup> Thomas, “City Planning in Soviet Russia,” 273.
- <sup>21</sup> Scott, “The Ideal Soviet Suburb. Social Change Through Urban Design,” 61.
- <sup>22</sup> Underhill, *Soviet New Towns*, 61.
- <sup>23</sup> *Ibid.*, 69.
- <sup>24</sup> Hamm, “The Modern Russian City: An Historical Analysis,” 34.
- <sup>25</sup> Č. Ignatavičius, E. K. Zavadskas, and L. Ustinovičius, *Modernization of Large-Panel Houses in Vilnius*, 1.
- <sup>26</sup> “Пятиэтажки: «сносить Нельзя Реконструировать» - Май-2013 - Строительство.RU.”
- <sup>27</sup> “Eurostat.”
- <sup>28</sup> L. Ustinovičius et al., *Statinių Eksploatavimas ir Atnaujinimas*, 5.
- <sup>29</sup> “Privatizavimo Eiga Lietuvoje po 1990 m. ir Rezultatų Įvertinimas,” 15.
- <sup>30</sup> *Ibid.*, 20.
- <sup>31</sup> *Ibid.*, 21.
- <sup>32</sup> *Ibid.*, 15.
- <sup>33</sup> “Išplėtus Butų Keliais Kvadratiniais Metrais - Nelauktas Konfliktas - DELFI Verslas.”
- <sup>34</sup> “Atnaujink Būstą.”
- <sup>35</sup> J. Ramanauskas, “Energetinio efektyvumo statybos sektoriuje priemonių įgyvendinimo iki 2020 m. iššūkiai profesinėms kvalifikacijoms.”
- <sup>36</sup> UAB “Miesto Renovacija,” *2010 metais atnaujintų (modernizuotų) daugiabučių namų atnaujinimo (modernizavimo) programos įgyvendinimo stebėseną*, 188.
- <sup>37</sup> *Mark #31*, 152–159.
- <sup>38</sup> Kimmo Lylykangas, *Energy-Efficiency Up-Grade with Pre-Fabricated Facade Elements - the Innova Project Renovation in Saturnuksenkatu 2, Riimäki*, 1–6.
- <sup>39</sup> “Пятиэтажки: «сносить Нельзя Реконструировать» - Май-2013 - Строительство.RU.”
- <sup>40</sup> “Московские ‘Хрущевки’ Будут Надстраивать, А Не Сносить.”
- <sup>41</sup> “Real Urban Art | English Russia.”
- <sup>42</sup> “Revisioning Amsterdam Bijlmermeer — Failed Architecture.”