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The International Conference on Contemporary Achievements in Civil Engineering, taking place in Subotica, Serbia, from April 25 to 26, 2024, is set to explore the latest innovations and forward-thinking ideas in civil engineering, architecture, and geodesy. This ninth edition of the conference is a platform for experts to share research, designs, and practices that push the boundaries of the field, offering a glimpse into the future of civil engineering.

The conference significantly contributes to the scientific community by serving as a forum for the presentation and discussion of the latest research, innovations, and practices within civil engineering and corresponding fields. It emphasizes the exchange of knowledge and ideas that foster scientific advancement and the application of new technologies and methodologies in the field, thereby playing a crucial role in shaping the future of civil engineering disciplines.

This year's conference is particularly momentous as it coincides with the 50th anniversary of the Faculty of Civil Engineering in Subotica. This landmark occasion not only celebrates half a century of academic and professional excellence but also reflects on the significant contributions the faculty has made to the field of civil engineering. The conference, in this celebratory year, stands as a testament to the faculty's enduring legacy and its commitment to advancing civil engineering.

Therefore, we wish to thank all the authors who have submitted their papers. Your contributions are invaluable to the scientific community and the success of this conference. Your research, insights, and dedication to advancing civil engineering, architecture, and geodesy help pave the way for future innovations and achievements. We are grateful for your participation and look forward to your continued engagement with our community.

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URBAN TRANSFORMATIONS AND PLANNING STRATEGIES FOR DEVELOPMENT OF LARGE HOUSING ESTATES IN THE POST-SOCIALIST CONTEXT: THE EXPERIENCE OF THE BALTIC COUNTRIES

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ABSTRACT

The fall of socialism and radical political changes in the 1990s established a new social, economic and cultural environment which shaped a new urban reality of the post-socialist city. One of them relates to inherited large housing estates (LHEs), one of the most striking spatial legacies of socialism whose future is considered as one of the key challenges in the urban development of the post-socialist city. National and local government's responses to LHEs development can be recognized through different strategies and planning approaches. The paper discusses those that are characteristic of the Baltic countries - Estonia, Latvia and Lithuania. Their experience of adapting the strategies and urban policies to the EU development and planning context may be of importance for the institutional and planning environment in Serbia. Besides the conceptualization of the post-socialist urban and housing policy and their influence on the transformation of LHEs in the Baltic countries, the paper is organized around two key research aims: 1) to investigate the types and intensity of physical-functional transformation of LHEs in the Baltic largest cities through up-to-date research of current challenges and future prospects of LHEs; and 2) to investigate national and local governments response to LHEs development in the post-socialist context, i.e. to identify a major planning strategies. The research findings suggest that building- and place-based

urban regeneration, rather than downsizing or even demolition of LHEs, is the sustainable strategies for their future development. Although a comprehensive regeneration strategy is seen as sustainable solution for Baltic countries context, there are still many challenges for its implementation. Possibilities and limitations for its application in the Baltic cities are reviewed in order to identify opportunities and obstacles for implementing a comprehensive regeneration strategy in the context of Serbia, for which it is a novelty.

KEYWORDS:

LARGE HOUSING ESTATES, POST-SOCIALIST URBAN TRANSFORMATIONS, PLANNING STRATEGY, THE BALTIC COUNTRIES

1 INTRODUCTION

The Baltic states or the Baltic countries is a geopolitical term encompassing Estonia, Latvia, and Lithuania, three countries which are situated on the eastern coast of the Baltic Sea. Historically, they have been in many different spheres of influence, from Danish over Swedish and Polish–Lithuanian, to German, and before independence in the Russian sphere of influence. Former republics of the USSR (from 1944 to 1991), all three countries became the members of the European Union, the Eurozone, NATO and the OECD since 2004. The World Bank classified them as high-income economies with a very high Human Development Index. The three governments engage in intergovernmental and parliamentary cooperation. There is also frequent cooperation in foreign and security policy, defence, energy, and transportation.

Although sparsely populated (in the EU context, only Sweden and Finland possess lower population density), the Baltic countries experienced remarkably rapid population growth during the post-war decades within the Soviet-era. Between the 1959 and 1989 Censuses, the population increased 31% in Estonia, 28% in Latvia and 36% in Lithuania. By the late 1980s, the population reached 1.57 million in Estonia, 2.67 million in Latvia and 3.67 million in Lithuania. However, in recent decades, the number of inhabitants has decreased in all three countries

During the Soviet-era, the Baltic countries enjoyed somewhat higher living standards and exhibited greater openness to Western influences than other union republics, which made Estonia, Latvia and Lithuania attractive to economic migrants from other parts of the USSR [1]. It can be said that the Baltic countries experienced demographic modernisation earlier than other regions of the USSR. A high demand for labour is driven by Soviet strategies for economic development, as well as slow population

growth in the host countries, particularly in Estonia and Latvia, contributed to the persistence of large scale immigration of industrial workers throughout the post-war decades. Due to their large numbers, migrants significantly transformed the ethnic composition of the urban population in the Baltic countries and influenced an increase of housing demand. In order to create new housing models which reflect political ideology and respond to the growing housing demand, the housing and urban policy in the USSR were based on rigid centralized urban planning and standardized mass housing production. This led to the intensive construction of modernist large housing estates (from here on, LHEs) in the Baltic countries as well, which were primarily concentrated in capitals and large cities. Although in the first post-war decades they were based on the urban principles of the garden city, the largest number of LHEs in Estonia, Latvia and Lithuania, as in case of other Soviet republics, were based on the application of the urban principles of international style.

After the political changes in the early 1990s, a new reality was formed - the reality of a post-socialist city. It is characterized by changed institutional planning conditions in the Baltic countries, which are reflected in changes in housing and urban policy. New types of private developers driven multi-family housing are emerging. At the same time, there was also a need for strategic approaches to the renewal of the inherited spatial legacy from socialist past – the numerous LHEs.

In order to recognize the strategic approaches, challenges and limitations for the sustainable urban (re)development of the LHEs in Estonia, Latvia and Lithuania, the aim of this research is to investigate and determine:

- key urban transformations that LHEs go through in the post-socialist period and their impact on the LHEs initial physical, functional and social structure;
- challenges and tendencies of strategic and planning approaches to the (re)development, renovation and regeneration of LHEs.

The research is based on the analysis of available data, informations and findings from previous research, documents and reference literature related to urban development, urban and housing policy in the Baltic countries in the post-socialist period.

2 BACKGROUND AND METHODS

Housing policy in the Baltic countries during the Soviet-era was generally based on the East European housing model [2], where, in search of models of equal housing for everyone, the numerous LHEs with socially-owned flats became a dominant type of housing provision, especially in capitals, administrative and industrial centers [3]. Centrally planned systems and government ownership of all land made possible a unified vision of urbanization and its on-the-ground realization. The economy was meticulously planned by central authority [4] to reach the industrial ambitions of fast-growing cities. Housing systems became firmly embedded in larger political and economic structures in the socialist regime [5].

After the dissolution of the USSR and regained independence of the Baltic countries, a series of profound reforms were carried out in the 1990s to transition from a centrally planned system to a market economy. Economic reforms and privatization of state enterprises were most radical in Estonia, while in Lithuania the transformation was slower and more gradual [6]. In the housing sector, all three countries implemented large-scale privatization of flats within the inherited LHEs to the sitting tenants, along with the restitution of housing to pre-war owners. As a result, the vast majority of housing became owner-occupied, and the rate of home ownership increased. In terms of housing supply, the diversity and quality of new flats have improved since 1990. However, most of the inhabitants of the Baltic cities still live in LHEs from the Soviet-era, which puts the issue of their (re)development and regeneration in the foreground.

2.1 LARGE HOUSING ESTATES DURING SOCIALIST PERIOD

Modernist LHEs, built between the 1960s and late 1980s represent a significant segment of the housing stock in Estonia, Latvia and Lithuania, as well as in their capitals and major cities. Mass housing construction was launched in the late 1950s. When the USSR disintegrated in 1991, 61% of the population of Tallinn (Estonia) and 74% of the population of Riga (Latvia) lived in LHEs built since the 1950s. By 2011, 58% of the population in Tallinn, 75% of the population in Riga and 67% of the population in Vilnius (Lithuania) lived in LHEs

The urbanization of Estonia, Latvia and Lithuania after World War II was strongly linked to in-migration from other parts of the Soviet Union. The acute demand for new housing, especially in the capitals of Tallinn, Riga and Vilnius, resulted in the massive addition of centrally planned modernist LHEs, which became the most important segment of housing stock and element of urban landscape.

The Soviet system provided a unique opportunity to experiment with new models of housing and city planning that was embraced by architects and urban planners [7]. Development of residential zones became a critical urban planning issue, while prevalent concept in urban planning became mikrorayon [8], which were further organized into makrorayons or housing estate districts. The number of people living in a typical mikrorayon ranged between 5,000 and 15,000 people, while the size of housing estate districts in Baltic countries varied even more, between 30,000 and 100,000 [8][9]. The usual spatial organization of the districts followed a superblock approach and incorporated the principle of co-mingling housing and services, thereby exploiting proximity opportunities by creating neighbourhoods which stressed accessibility (and a scientific approach for ensuring minimum distances). A key element of spatial plans of modernist mikrorayons was the provision of green space. Green buffer areas were intended to enclose industrial zones and delineate housing estate districts. In addition, an organized system of pathways provided walking access for commuting to work, to schools, to service, commercial and leisure centers, and to public transport stations.

Some researchers [10][11][13] [7] consider that the LHEs in the Baltic countries were more ambitious and often more original than others within the vast housing program of the Soviet Union, which is attributed to the influence of architectural and urban

movements and innovations from Nordic countries and Western Europe, even North America. Architects and urban planners from Estonia, Latvia and Lithuania specifically reproduced urban concepts from Finnish and Swedish housing estates. The design inspiration was particularly evident in Estonia due to its close ties with Finland. Relationship between the two countries could be described as a “hinge-point” of architectural influences between “Western” and “socialist” countries during the Soviet years [10]. In this way, two forces combined in the LHEs in the Baltic countries in the first decades after World War II - international modernism and Soviet socialism. The outcome was a cityscape that integrates Western ideas and the specific context of the Soviet system. Inspired by Nordic design, the key features of the first LHEs in the Baltic countries included low-rise apartment buildings, human-scaled design, small and compact neighbourhoods, landscape elements and mature trees, protected pathways and convenient walkability. LHEs in heavily treed districts in Tallinn (Mustamäe), Riga (Āgenskalna Priedes) and Vilnius (Lazdynai) were inspired by the natural landscape retained in the design of Tapiola and the Finnish concept of the “forest-suburb” (Berger et al., 2019). Two LHEs from the Baltic countries received the prestigious Soviet Union State Award for Urban Housing Design: 1) Žirmunai (Lithuania) in 1968; and 2) Vaike-Oismae (Estonia) in 1986. The Lenin Prize, the highest award in the Soviet Union, was awarded in 1974 to LHE Lazdinaj in Vilnius.

However, the distance from western models was maintained due to a greater degree of standardization and poor design norms for flats and buildings. Additionally, by the late 1960s many of initial LHEs features had been abandoned for the sake of efficiency. The orientation towards concrete and prefabricated panel system in shaping the physical structure of LHEs (from the mid-1960s to the 1980s) can be explained by a political shift that prioritized attention to housing needs and industrialized the construction industry. Mass construction techniques allowed the LHEs established in the 1970s and 1980s to become larger and denser and to have taller buildings (16 stories are the highest in the Baltic cities). Landscaping was virtually absent, in sharp contrast to the earlier heavily treed LHE.

The USSR housing policy, with its vigorous focus on equality and related flat building models and spatial planning rules, often led to monotonous architecture, unwelcoming public open space (from here on, POS) and unending repetition of housing buildings [7]. In later decades, the Soviet influences became more prominent as each new LHE became denser compared to previous projects. Still, the architecture and urban planning of LHEs in the Baltic countries was less grandiose and with a stronger link to nature compared to many other cities in the USSR and Eastern Europe.

2.2 LARGE HOUSING ESTATES IN POST-SOCIALIST PERIOD: CURRENT TENDENCIES AND CHALLENGES

Political, social and economic changes after the 1990s influenced changes in urban and housing policy and different approaches to development and maintenance of LHEs in all three countries. In addition to certain differences that are the result of the development path of each of them, these three countries share similar tendencies and challenges related to the current trends and future treatment of LHEs. The focus of

this part of the research is on capital cities, since the available literature and data mainly refers to them.

2.2.1 Estonia

LHEs hold a dominant position in the housing market of Tallinn - slightly less than two-thirds of residents lived there in 2011. These housing segments were attractive to mixed socio-economic status groups in socialist period. Conducted research [12] indicates that the socio-economic and ethnic position of LHE changed over the course of the period of political and economic reforms (1989–2000) and the subsequent decade (2000–2011) and suggest steady, downward trajectory in the social composition of the LHEs.

Rapid economic and political reforms during the 1990s introduced new, market-based foundations for the housing market. Estonia stands out for its radical institutional transition from being highly state-controlled to being one of the most neoliberal market-oriented system [13]. During the ownership reform after the Soviet era, sitting tenants could privatize their flats free-of-charge (unless the pre-World War II owners returned to their flats, as was the case with older housing stock) [12]. Overall, the share of privately owned housing grew to 96% in Estonia by 2002, while the share of privatization in housing estates in Tallinn was near 100%. The flats became owner-occupied without further subsidies from the state for regular maintenance, for which the Home-owner's associations became responsible.

Since 2000, new infill housing development is occurring in most LHEs. It became a primary post-socialist urban change of LHEs after privatization. As the property prices of these flats are far above the average for housing estates, it seems that these new developments are likely to have an impact on the existing social structure of LHEs, parallel with the further spatial segregation of the population with lower social standing in peripheral LHEs that are not attractive to "gentrifiers" – private developers. Some of LHEs retained a social and ethnic mix, while others became mono-ethnic over the time. According to a study conducted by Hess et al. (2018) [13], the renovation of existing buildings has yet to affect the socio-economic structure of residents, whereas another study noted that there are inevitable effects on the social environment when new apartment buildings are built in LHE.

LHEs in Tallinn went through different urban transformations in post-socialism, depending on their size, location, period of construction, degree of (in)completion during socialist period, and their ethnic composition. For example, some neighbourhoods in Mustamäe and Haabersti (VäikeÕismäe) LHEs stand out with more successfully implemented neighbourhood plans, with more developed POS - recreational areas and greenery, which all adds to the upkeep of social stability and attractiveness. From other hand, the future of other LHEs located in Northern Tallinn is less clear, given their density, age and type of the housing stock, as well as presence of ethnic minorities. Regardless of the attractive location in terms of natural surroundings and access to the inner city, historical trends seem to hinder their physical and social regeneration.

However, LHEs in Tallinn still has much strength, including their prevalent role play in the housing market, good connectivity to the city center and good infrastructure.

Applying a targeted urban policy could still lead to the reversal of social, ethnic and development trends. For example, inclusion of mixed ethnic and middle-class status families into the LHE can contribute to the overall transformation of LHE environment, making these areas more attractive and livable. Some of the initiatives, such as developing community activism, community gardening, developing POS and subsidies to housing renovations are already on the way [14]. Nevertheless, comprehensive integrated place-based urban regeneration projects are yet to follow.

2.2.1 Latvia

The processes of the last decades in housing reform - denationalization and privatization of the existing housing stock, land reform, etc., have caused significant changes in the way LHEs are managed and maintained. Denationalization and privatization of flats by the sitting tenants in Latvia began in 1991. Almost 99% of the municipal and state-owned buildings were offered for privatization. As a result, the ownership structure of the housing stock has considerably changed in Latvia.

In Riga, more than 80% of the housing stock is privately owned. This has led to a broad and complex structure of multiple stakeholders which significantly delays defining common interests, setting goals and collective decision-making [15]. As approximately 60 % of Riga's residents live in LHEs, which compose 40 % of the housing stock in the city, the future of these areas is an urgent topic in the context of the future urban development in Riga. Significant influence regarding the possibilities for any improvement and renovation projects in LHEs depends on land reform. Following the privatization of real estate and denationalization of residential buildings when land was tied to each building, the current land ownership structure is complex and fragmented. The management system did not keep up with such rapid ownership reforms in the housing areas either. Observations of the current status of buildings and POS show that the existing housing management system fails to implement substantial renovations of the living environment resulting in a considerable part of the housing stock being exposed to the risk of degradation. In most cases, the decisions that enabled apartment tenants to become apartment owners were not made with full awareness of the resulting rights and responsibilities of multiple stakeholders [16].

Since Latvia joined the EU, funding for renovation of LHEs buildings has been made available. The Economic Ministry and other responsible institutions have carried out an information campaign. New legislation concerning adjustments to the management of residential buildings was enacted to support renewal of the housing stock. However, the number of renovated residential buildings is still very small. Lack of understanding about the legal relations between landowners, managers and apartment owners as well as lack of knowledge about their mutual rights and responsibilities creates frustration and passivity with regard to maintaining and improving the housing environment. Denationalization of land properties during the 1990s creates the legal basis for new construction in the non-built areas (i.e. green open spaces). The increasing demand for housing in Riga led to the new infill housing development in some LHEs. Previous research data shows that about 60 residential buildings were constructed in the POS within LHEs since 2000 [17], as well as a large

number of buildings near their borders, which led to further densification of LHEs and decrease of existing public open space. During the 1990s, and especially the 2000s, the outer suburbs and LHEs also experienced a large-scale increase in new infill commercial development (office buildings, shopping centers, warehouses etc.).

LHEs in Riga are not homogeneous residential areas. Some of them are at risk of physical decay and social exclusion; some are more stable in terms of residential composition, while others are exposed to gentrification. Previous studies [18] have shown that the causes of LHEs degradation are related to share land ownership, management problems, locations, period of construction, as well as social-economic and ethnic status. In order to carry out complex reconstruction projects, effective planning, financing and management, as well as legal instruments must be developed. The risk of physical and social decay could be partly overcome by municipal level regeneration initiatives. Still, current tendencies suggest that the direction of future socio-spatial development is not yet set in many LHEs in Riga. However, despite significant problems and changes, Riga's LHEs are active parts of the city where most of the inhabitants live. Flats are in active demand in the real estate market; their price is about 50–70% of the price of new flats in the same district [19]. Population surveys also show a high level of satisfaction. In various surveys, 70–90% of the population report that they are satisfied with the residential area [20].

2.2.2 Lithuania

Since the 1990s, when the transition to a market-based economy began, the socio-spatial development of Lithuania has been characterized by several important changes: shrinkage of population, metropolization, suburbanization and increasing segregation. All of these processes have had an effect on the spatial, social and economic structure of LHEs. Today, Soviet-era apartments accommodate around 62% of the Vilnius population (compared to 71.5% in 2001) and are scattered throughout the city (based on 2001 and 2011 censuses).

Although LHEs are definitely not the most attractive residential areas in Vilnius, and more affluent groups increasingly prioritize residing in other parts of the city, they maintain a rather neutral position in the current residential structure of Vilnius. Namely, while significant spatial transformations of the whole Vilnius metropolitan region were accompanied by major changes in social structure, such as an increase in social and ethnic segregation [21], LHEs stay the most stable neighbourhoods in Vilnius city, experiencing only minor changes in their ethnic and socio-economic structure [8].

Since LHEs in Vilnius are not homogeneous residential areas, they were marked by different urban changes in the post-socialist period. LHEs such as Karoliniskes, Justiniskes and Seskinė were fully built up during the Soviet-era, and there were hardly any possibilities for post-socialist development. On the other hand, Žirmunai and Lazdinai (Figure 2), the unfinished LHEs during the Soviet-era, were the districts where most of the post-socialist construction took place, mostly in the form of new infill residential and commercial development. Additionally, in recent decades the new housing estates have been built near LHEs in various parts of Vilnius, influencing changes in LHEs itself.

A new development tool, the EU supported “Neighbourhoods programme” were defined in 2017 by the city government (Vilnius City Municipality 2018), aims at revitalization initiatives for LHEs and 1288 neighbourhoods consisting of Soviet-era apartment buildings. Financial aid is provided to those neighbourhoods, whose communities actively cooperate and participate. This programme is in its initial phase and therefore, it is difficult to predict its success and effect. The uneven spatial distribution of renovation projects also indicates the presence of social differentiation among the residents in the LHEs. In Vilnius, the revitalization of LHEs could be facilitated by the active involvement of city government in the development of infrastructure such as construction of additional car parking places, improvement of transport junctions, creation of sites attractive for small businesses and group renovation of housing.

3 RESULTS AND DISCUSSION

Current tendencies and future activities related to LHEs renewal and regeneration strategies largely depend on how they are treated in the urban and housing policy, particularly in integrated urban development which is recognized at the EU level as a prerequisite for sustainable European cities. Analysis of the results of the implementation of the principles of the “Leipzig Charter on Sustainable European Cities” [22] five years after its adoption, indicated that Latvia and Lithuania belong to the group of countries with national or regional programmes or with national guidelines for integrated urban development (of deprived neighbourhoods), while Estonia belong to the group of countries with predominantly local approaches to integrated urban development (of deprived neighbourhoods).

In Estonia, an independent urban policy and approaches for an integrated urban development only play a secondary role at national level [22]. This is supported by the fact that no financial support programme has been established in this area so far. Furthermore, the Leipzig Charter only has a minor importance for the Estonian urban policy. Urban development and renewal are determined by private (market) actors, whilst the public sector only retains a framing role through spatial planning. First steps to an integrated urban development are nevertheless being experimented as part of the national implementation of EU Structural Funds. Since 2008, measures and projects for the design and improvement of public/green/open spaces, creation of sustainable urban transports and the improvement of social infrastructure (especially child care) have been supported in five major Estonian cities under the Development of Urban Areas programme. Urban development in Estonia is mainly the responsibility of municipalities. Main topics of concern typically include the upgrading of inner cities and public space, urban regeneration of neighbourhoods and the housing stock (rehabilitation, renovation, neighbourhood improvement, increasing building energy efficiency) as well as sustainable urban transport.

Although Latvia has so far not yet established a national programme explicitly addressing integrated urban development, the Sustainable Development Strategy of Latvia up to 2030 (SDSL) and the Latvian National Development Plan 2007–2013 (NDP) are two essential strategic development and planning documents pursuing a geographically and socio-economically balanced development of the country [22]. They also include the first approaches to an integrated urban development. The implementation of an integrated urban development policy in Latvia is almost exclusively located at local level and addresses for the most part building and urban regeneration (redevelopment, improvement of transport and public infrastructures, improving residential environments).

A massive disinvestment and dereliction of the building fabric in Lithuania, as the consequences of extensive privatization of its municipal housing stock in the 1990s, become the central challenge for urban development in Lithuania. Moreover, restricted housing market significantly limits accession opportunities for lower-income households. In response to this situation, the Lithuanian Housing Strategy 2004–2020 was adopted at national level to set relevant targets for an integrated urban development [22]. This encompasses the creation of social housing and conventional residential opportunities for vulnerable population groups (low-income earners, unemployed, young families) as well as promoting social cohesion and mixing. The Programme of Refurbishment of Multifamily Buildings was issued in 2004 to help implement the Lithuanian Housing Strategy and promote energy efficiency in the housing stock. The capital, Vilnius, has many years' experience in the area-based development of deprived neighbourhoods. This is the case in city-wide integrative approaches such as the Vilnius City Strategic Plan 2002–2011 and the Comprehensive Plan of the Territory of Vilnius City Municipality (Vilniaus miesto savivaldybės teritorijos bendrasis planas iki 2015 metų).

Common for all three countries is that the new housing opportunities that have been introduced to the housing market in the transitional and market-oriented period tend to emphasize the weaknesses and challenges of the LHEs. Mostly LHEs were unfinished in the early 1990s in relation to the original goals of the housing program within which they were conceived and planned. The changed circumstances have called into question the approaches and strategies of their (re)development and renovation. In this sense, various renovation strategies have been introduced to prepare the LHEs for their future life in the context of the transition from a highly controlled and socialist housing system to a market-oriented neoliberal system (Hess et al., 2018).

Three approaches or periods of LHEs renovation during post-socialism can be recognized in all three countries: 1) “do-nothing” approach and “do-it-yourself urbanism”; 2) building-based renovation; and 3) place- or area-based renovation.

The “do-nothing” approach and “do-it-yourself urbanism”, that characterized the first years of the transition, gave way gradually to building-based renovation, although is still present in some deprived LHEs.

Building-based renovation is a long-standing approach to LHEs renewal in Estonia, Latvia and Lithuania. Financial support may be acquired for buildings and flats

renovation from European funds for improving energy efficiency (KredeEx in Estonia, JESSICA in Latvia and Lithuania). The focus of European support is on improving the overall energy efficiency of the building envelope as well as ventilation and indoor air quality, aiming at nearly zero-energy buildings [23].

The next step or next strategic approach to the renewal of LHEs can be place-based renovation, or a more integrated and comprehensive urban regeneration coordinated by the public sector, which would help to improve management not just at the building level but on the level of the whole LHEs. To achieve better results, Hess and Tammaru (2019) [24] emphasized that individual, building-based renovation should be continued, while place-based or neighborhood-based renovation should be introduced in order to stabilize the development trajectory of the LHEs.

The SmartEnCity initiative in Tartu and Estonia is a promising example of what can be accomplished by moving from a building-based to place-based approach in regeneration of LHEs within an integrated sustainability and "smart city" framework. It includes: 1) retrofitting apartment buildings; 2) modernizing public and private transportation systems; 3) adapting neighbourhoods to new lifestyles; 4) establishing new uses and activities; and 5) focusing on place-making (Ahas et al., 2019). It also addresses apartment buildings, their surroundings and POS, the people who inhabit them, and connectivity through integrated planning and holistic revitalization and regeneration. Financial schemes for such renovation programmes are complex and beyond the reach of single Home-owner associations, but assistance can be provided through pan-European energy efficiency programmes such as KredEx and JESSICA, enhanced by other funding sources such as municipal governments, private banks and stakeholder involvement [23]. For sustainable and viable solutions to emerge, the public sector must again assume a prominent role. A comprehensive renovation strategy must be structured to include urban space even larger than individual flats or buildings and encompass: 1) improving the physical environment of the buildings and neighbourhoods; 2) enhancing the social mobility and social integration of the inhabitants (since many possess an ethnic minority background); and 3) facilitating integrated connectivity between housing estates and surrounding metropolitan space through transport, jobs, services and various other activities [24].

4 CONCLUSIONS

Despite emerging trends towards suburbanization and gentrification, LHEs built between the 1960s and 1980s still accommodate a large share of the urban population and shape the urban milieu in Baltic cities.

The key LHE urban transformation type in post-socialist period became new infill development on different spatial scale, similarly as in other European countries. Infills have been implemented for several decades and have greatly influence on public open space within LHEs. In the capitals, new infill development in the LHEs includes public,

commercial and residential buildings and areas, where introduction of high quality residential development at the edge of the LHEs became quite popular in unfinished, well located LHEs. New infills are built as gated communities or as new residential areas on large empty spaces within LHE.

Current tendencies and future activities related to LHE renewal strategies indicate that building-based renovation is the dominant mode of LHE redevelopment in all three Baltic countries. However, the importance of place-based, more integrated and comprehensive urban regeneration coordinated by the public sector is also recognized. Examples of good practice are noted, but comprehensive integrated place-based urban regeneration projects and clearly defined strategic approaches are yet to follow.

It can be concluded that in all three countries, the beginning of the 2010s marks the period when discussions about LHEs began to gain importance. In addition to the support of the different EU funds and networks, new planning and financial instruments are being developed, while the inhabitants increasingly participates in debates and activities related to LHEs planning activities. It seems that the Baltic countries are on the way to form urban strategies and planning instruments of sustainable urban (re)development and re-generation of LHEs. Nevertheless, comprehensive integrated place-based urban regeneration projects are yet to follow.

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