11. Innovation in Housing: Decarbonization in Latvia

Knut Höller

Structure of the Stock

The available housing stock in Latvia is rapidly aging and depreciating. Dealing with the building stock is one of the most difficult issues in the country's further transition to a market economy. Achieving climate neutrality in the building stock by 2050 through energy refurbishment must be combined with solving some other fundamental issues, such as the availability of affordable and quality housing, thus encouraging residents to remain in the country and increasing their mobility.

Approximately 1.4 million buildings with a total area of 206.56 million m^2 are registered in the country. Of all buildings, 363,900 are residential buildings totaling 91.08 million m^2. About 285,000 buildings are heated. The number of single-family houses is the largest (309,900; compare this to 13,938 two-family houses), but by area this is only 17.6 percent. Multifamily buildings (three or more dwelling units) represent the largest proportion of the total area (51.55 million m^2) with 24.9 percent, although they represent only 2.81 percent of the total building stock (39,400 buildings). Almost half of the residential buildings (44%) are in the capital Riga and its surroundings (Pieriga). In the very sparsely populated southeastern region of Latgale, bordering Russia and Belarus, the number of single-family houses is larger than in Riga's surroundings. The number of non-residential buildings (roughly 1 million) indicates that only 18.5 percent of all non-residential buildings are concentrated in Riga (about 74,000) and the other eight so-called large cities of Latvia (111,000). Of the non-residential buildings, only 108,000 are heated.

A large proportion (44.5%) of the multifamily buildings were built before 1941. Of these, more than 8,600 buildings have exterior walls made of wood.

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

Buildings constructed in the postwar years (1941–1960) were characterized by good quality, and in the housing sector, mainly brick buildings were built as part of the standardized Stalin-era projects.

Majority of outdated standardized multifamily buildings

Most of the buildings were built during the Soviet period and before 1992 (51%). The Soviet buildings were mostly built of industrial prefabricated construction in various typical building series, before the time when thermal requirements were significantly increased, and thus these buildings exhibit a very low level of energy efficiency.

Most of the various typical construction series (fig. 1) were built in the period from the 1960s to the beginning of the 1990s. Clay bricks, aerated concrete and, claydite concrete are materials widely used in external walls. Later, several special projects were carried out, and construction of reinforced concrete and claydite concrete large-panel buildings predominated.

The Association of Management and Administration of Latvian Housing (AMALH), the largest and most experienced interest group of municipal and private housing management companies, points out that some construction series have already reached their originally projected lifespan. The serial buildings typical of the 1950s and 1960s, the so-called "Khrushchyovkas" and "Brezhnevkas" are technically and morally worn out. Most of the other building types will follow the same fate in this decade and the next. This issue, which affects a large proportion of homeowners, has thus far not been sufficiently addressed in terms of building physics, economics, and social consequences, and appropriate strategies for dealing with it have not been developed (Dzedulis 2020).

After gaining independence in 1991, the construction rate for new homes has never again reached that of the socialist era. Only about 10 percent of all residential buildings were built after 2003. Of the multifamily buildings, only 3 percent were newly built after 2003 (4.4% after 1993). Only buildings constructed after 2015 meet the currently valid thermal requirements, although buildings constructed between 2003 and 2015 come close to meeting them (Ministry of Economics 2015).

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

Sociodemographic Issues

Low population density

Population density in Latvia at the beginning of 2018 was thirty persons per km^2. The area of Latvia is 64,600 km^2, which is practically equivalent to the total area of five smaller EU countries (Belgium, Slovenia, Luxembourg, Cyprus, and Malta): 63,100 km^2. At the same time, the population of Latvia in 2017 was 1.95 million, whereas the combined population of Belgium, Slovenia, Luxembourg, Cyprus, and Malta was 15.32 million. The number of inhabitants in Latvia is roughly equivalent to that of the cities of Hamburg or Vienna. By 2050, a further population decline to 1.4 million inhabitants is forecast. After Latvia's independence, the housing market changed radically and has remained in an unstable and deformed state for about thirty years.

Deformed housing market: homeowners predominate, rental relationships mainly in the shadow market

Like many former Communist countries in Central and Eastern Europe, home ownership is by far the dominant tenure in the Latvian housing market. The privatization of the housing stock in the 1990s had the result that just over 7 out of 10 Latvian households live in housing that is owned outright (i.e., without an outstanding mortgage or housing loan), which is well above the OECD average of just under 43 percent. Fewer than 9 percent of Latvian households live in owner-occupied housing with a mortgage, which in turn is significantly lower than the OECD average of almost 25 percent.

Meanwhile, Latvia's rental market, consisting of both private and subsidized rentals, is very small from an international perspective, representing around 12 percent of all household tenures; the rental housing makes up on average 28 percent of housing tenures in the OECD. There is, by extension, a sizeable "shadow" rental market in Latvia, though there are no data to indicate the size of this segment of the market. Lithuania, Slovakia, Hungary, Poland, Slovenia, and Estonia have a broadly similar housing tenure structure. With a share of 0.4 percent of the total housing stock in 2016, Latvia has the smallest social housing stock in the EU (8% on average). There are currently 7,000 people waiting for housing.

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

Housing situation often difficult and in poor technical condition

At the request of the Latvian government, the OECD analyzed the Latvian housing market in 2019 and 2020 and made recommendations for an affordable housing policy.

Latvian households currently do not spend much on housing costs on average. Expenditure on housing and utilities is around 21 percent of the final consumption in Latvia and compares to the OECD average of around 23 percent. However, the low spending masks another challenge: poor housing quality. In many cases, basic sanitation facilities in 2017 are missing. In addition, some 15 percent of Latvian households suffer from "severe housing deprivation." Eurostat (n.d.) defines severe housing deprivation as living in a dwelling with overcrowded conditions in addition to at least one of the following housing deprivation measures: leaking roof, no bath/shower and no indoor toilet, or a dwelling considered too dark. OECD countries with a high rate of severe housing deprivation tend to be dominated by homeowners. In Latvia, nearly 60 percent of the "severely deprived population are homeowners, while 25 percent are renters, either in the private market or in subsidized housing.

Lack of affordable housing limits society

There is another challenge that is not immediately obvious from the typical housing affordability indices: Most Latvians cannot afford a mortgage to buy a home—meaning that many renters cannot afford to become homeowners, and many homeowners cannot afford to move. Across the country, fewer than half of Latvian households could afford a new mortgage on a 50 m^2 apartment, while only one third could afford a mortgage on a 75 m^2 apartment. The OECD calls this group the so-called "missing middle" households and sees them facing the following challenges: "The first is that the housing market lacks affordable rental housing alternatives that would typically be available to lower- and lower-middle income households who may not be able to afford a mortgage to purchase a home. The second is that the large share of homeowners (who are ineligible for existing housing support) live in housing of poor quality and are not able to afford the costs associated with maintenance or upgrades" (OECD 2020:51). This results in a situation where around 44 percent of all households (equals 1/3 of population) are too rich to qualify for social housing and the housing benefit, and too poor to afford a mortgage. As a result, the Latvian government is currently working on the issue of housing affordability, planning various programs to increase the supply of affordable housing and completing a reform of the outdated tenancy laws. Another issue related to population decline

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access -

and internal population migration from the provinces to the Riga metropolitan region is the vacancy rate of flats. The Housing and Population Census 2011 (CSB 2011) found another factor influencing the structure of the housing stock. One in five dwellings has no permanent occupant or is unoccupied. One challenge will therefore remain: How does one deal with housing stock that is no longer needed and who bears the costs for its removal?

Governmental Targets for Housing Decarbonization

Latvia's medium- and long-term climatic objectives are presented in the National Energy and Climate Plan 2021–2030 (NECP), which also contains information on the housing stock and decarbonization (NECP 2018). This document has priority over the Long-Term Strategy for the Renovation of Buidlings (LTRS). Both documents were submitted to the EU Commission in 2020. The goals to be achieved in the new EU funding period 2021–2027 are included in the National Development Plan of Latvia for 2021–2027 (Latvijas Nacionālajā attīstības plānā 2021–2027, NAP2027).

Latvia intends to achieve climate neutrality by 2050. Policies and measures described in the NECP are focused mainly on the transport and building sectors, as well as on the heating and cooling sector. The implementation of these measures will largely depend on available EU funds, as has been the case over the past decade. This dependency so defined brings some uncertainty into national planning and related subordinate documents.

In terms of the energy efficiency of buildings, Latvia plans to improve the energy efficiency of the entire residential building stock. For buildings, an average heat consumption of 120 kWh/m^2/year in 2030 is foreseen for the heating supply. Explicit renovation targets (NECP 2018) are, in particular, the refurbishment of at least 2,000 apartment buildings and at least 5,000 single-family houses by 2030.

Even though the number of multifamily buildings renovated annually has been lower so far and renovation of private single-family houses has only recently been supported at all, this goal seems realistic. However, this will not be enough to decarbonize the building stock by 2050, and it does not adequately reflect the energy-saving potential of the building sector in Latvia. It is assumed that by 2050, due to the age and depreciation of the stock, 30 percent of the residential buildings will no longer be fit for refurbishment. The LTRS and other documents indicate that 30 percent of the building stock is to

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

be renovated per decade. The necessary investments for all types of buildings by 2050—which, depending on their area, range from €200/m² to €400/m² in consideration of current construction costs—amount to approximately €19 billion. Table 1 shows the financing gap for residential buildings.

Table 1: Funding Gap for Apartment Buildings (source: LTRS)
Total Funding Gap for Residential Apartment Buildings

Variables	Values
Total number and area of apartment buildings	38,600 54.4 million m2
Number and area of apartment houses where it is possible to carry out cost-effective recovery	27,000 37.8 million m2
Cost of energy efficiency improvements and other emergency renovation works	€200/m²
Total financial need	€7.54 billion
Proportion of houses potentially interested in energy efficiency measures	60%
Total investment cost (actual financing needed)	€4.52 billion (60% of €7.54 billion)
Potential funding required over 10 years	€1.5 billion (1/3 of total investment)

For the approach to energy retrofitting, the Latvian government has defined a cost-effective approach based on Article 5 of the European Directive on the Performance of Buildings (EPBD) Directive 2010/31/EU. In practice, this means that 60 to 70 percent of Latvia's housing stock can be renovated in a cost-effective way. This is approximately 25,000–27,000 multifamily buildings, or about 37 million m². The NAP2027 plans improvements to the energy efficiency of 40,000 flats for the current funding period (CSCC 2020), which corresponds to approximately 800 apartment buildings (assuming a flat size of 50 m²). This would result in renovation of 2 million m² in total. It is also planned that 10,000 new apartments will be built each year by 2027 within the framework of the plan. Furthermore, considering that according to surveys 60 percent of the flat

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

owners are interested in refurbishment with EU cofinancing, 4,860 apartment buildings can be set as the primary target (30% per decade corresponds to 8,100 apartment buildings).

To achieve this primary goal, investments of €1.5 billion would be necessary. In the NAP2027, €163,125 million are indicatively foreseen as available for the renovation of residential buildings. Combined with the same amount of commercial loans, this would result in a financing budget of €326 million. The 10-year financing gaps for private houses (€1.54 billion) and municipal buildings (€1.63 billion), in addition to the technical and socioeconomic challenges, also affect Latvian society.

Latvian citizens cannot rely on an institutionalized housing sector due to mass privatization. Dealing with this situation will occupy society for many years to come and makes the challenges of decarbonizing the building sector seem both an opportunity and a curse. Although it has so far not been considered, the need to regard urban neighborhoods in their entirety and to develop suitable concepts for them comes into play here, both for the sake of decarbonization and for socioeconomic reasons.

Refurbishment Rate

As a result of the mass privatization of housing, the management, care, and maintenance of housing in the country also had to be reorganized. In this protracted process from the mid-1990s to the mid-2000s, relatively little was invested in the renovation of multifamily buildings. The fragmented ownership structure did not allow for holistic renovations and the owners mainly implemented individual measures, especially the replacement of windows and apartment entrance doors. In many cases, this did not significantly improve the energy situation, and these measures were often accompanied by additional structural problems, such as the formation of mold.

State support in a noticeable and continuous approach for more energy efficiency in residential buildings started in Latvia only after accession to the EU in 2004. Due to the complicated situation in the new member states resulting from mass privatization of the housing stock, the EU opened access to EU structural funds and thus made it possible to finance energy-efficient renovations in apartment buildings. For Latvia, this meant ending years of reluctance to support homeowners and paying more attention to the issue of energy efficiency of buildings.

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access -

In the first financing period from 2007 to 2013, a first state support program for the refurbishment of multifamily buildings was launched. After several years of preparation for the program, the Latvian Investment and Development Agency (LIAA) finally coordinated the first funding program, which was officially regarded as an initial start so as not to set expectations too high. Of the planned funding of €77.8 million, €63.2 million could be used during the funding period. Of 1,365 project applications submitted, 741 buildings were renovated. The investment costs of the completed projects amounted to €149.7 million.

In the following funding period from 2014 to 2020, the state financing institute ALTUM, established in 2013, took over coordination of the funding program for energy efficiency in residential buildings. The submission of projects was launched in September 2016 and these will be implemented by December 31, 2022. Applications for 989 projects for an indicative amount of €420 million have been submitted throughout Latvia since the beginning of the program in spring 2016. Within the framework of the measure, construction works have been completed in 264 buildings; there are 51 multi-apartment houses in the renovation process, while the other projects submitted are at different stages in the preparation of the project. The Latvian government recently allocated an additional €35 million budget for the renovation of apartment buildings, which will cover the potential gap between the funding periods, and some 138 additional buildings will be renovated.

Consequently, the renovation rate in Latvia is very low despite these efforts. Only about 1,000 apartment buildings have been comprehensively renovated since Latvia's independence and, as can be seen here, mainly only after 2009. The renovation rate in the last ten years was therefore around 2.5 percent, with large annual fluctuations due to the discontinuous provision of subsidies. The annual refurbishment rate is therefore far below 1 percent, and increasing this remains a very big challenge for Latvia in the coming years and decades.

As mentioned above, Latvia has set a target to renovate 2,000 residential buildings in ten years (2021–2030), which corresponds to a renovation rate of 5.2 percent (= 0.52% annually for 38,600 buildings or 0.74% for 27,000). The term "refurbishment rate" is defined in the NAP2027 for the first time ever as a new indicator, for which there is no data yet to allow setting a baseline and target values. For the base year 2021, the target values for 2024 are 2 percent and for 2027, 3 percent (as the share of renewed housing compared to total housing numbers per year). A "renovation wave" for the country is hugely important

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

economically. This sector clearly requires more attention than before, including a more precise definition of the renovation rate to be achieved.

Energy Efficiency Standards

The energy consumption of the building sector (households) accounts for up to 30 percent of the total energy sector, so the building sector has significant potential for achieving overall energy-efficiency targets. Most existing buildings have a high level of energy consumption, along with a significantly lower thermal performance than could be provided by currently available technologies. Most of these buildings will be in operation for a considerable period, so a complex renovation of these buildings, which would improve their energy efficiency, is important. However, the existing depreciation of residential and non-residential buildings should also be emphasized. According to the data provided by the State Land Service, the total percentage depreciation of residential buildings is 38.9 percent, while the depreciation of non-residential buildings is 41 percent.

Latvian legislation took several years to replace Soviet building standards and gradually raise thermal standards. Only since 2015 have there been stricter requirements for the building envelope. The Cabinet of Ministers Regulation on Energy Certification of Buildings (2013, amended 2015) introduced six energy efficiency classes and defines energy efficiency requirements for renovated buildings. Above the stated treshold level for heating (Class F, above 150 kWh/m^2/year) buildings need energy performance improvement measures.

In April 2014, the requirements of the recast Directive 2010/31/EU were included in the National Construction Standard. This has been followed by a new construction standard (in force as of 2020). The new standard directly incorporates the energy performance requirements (in kWh/m^2/year) for new and reconstructed or renovated buildings. In turn, the objective of the adjusted maximal U values is to eleminate the design of unsafe construction elements.

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

Figure 1 + 2: A typical Series 104 apartment building from the 1970s before and after refurbishment (more than 60% energy savings). The building in Jelgava was one of the first to undergo complex refurbishment and received the award in the "The Best Energy Efficient Building in Latvia" competition in 2010.

Source: Knut Höller.

From 2021 onwards, newly constructed residential buildings must be nearly zero-energy buildings and the allowed level of energy efficiency of apartment buildings that are renovated is </= 80 kWh/m²/year (single-family houses </= 90). So far, Latvia has little practical experience with nearly zero-energy buildings, mostly in the form of pilot projects. This development is to be further supported with funding programs. The benchmark for renovated buildings, on the other hand, does not seem very ambitious. In practice, higher savings have been achieved in many cases, which would make even lower target values seem realistic. If the average energy consumption was 165 kW/h/m²/year, then it was, on average, 67 percent lower, or 54 kWh/m²/year after the refurbishment work.

Since 2010, the Law on the Management of Residiential Buildings has been in force in Latvia. Pursuant to Article 8 of the law, a "house file" shall be established for each residential building. The house file may be in hard or electronic form and includes technical documentation, such as a technical passport (plans, schemes), project documentation, energy passport and energy plan, and findings from a technical survey of the house. Other information relevant to the administration and management of the residential building may be included in the house file.

There is also Cabinet Regulation No. 907 of September 28, 2010, "On surveying, technical maintenance, current repairs and minimum requirements for

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

energy efficiency of a residential house," which lays down minimum requirements for ensuring the energy efficiency of a residential building. Pursuant to this regulation, the manager of a residential house is obliged to plan energy-efficiency improvement measures if the average thermal energy consumption of the residential house exceeds the requirements laid down in the regulation.

Especially in residential housing, with its atomised ownership structure, the work of administration managers and providers of maintenance services is very important. Admininistration managers have an increasingly important role to play in the planning and implementation of refurbishment projects. Latvia has taken this into account by introducing compulsory training for administrators and obilgatory qualifications, which is not yet common internationally.

Financing Tools

The main financing instrument for energy refurbishment of residential buildings is a combination of subsidies and commercial loans. The subsidies consist of EU funds (85% majority) and state budget funds. The available budgets are closely linked to the EU structural fund periods. This has so far periodically led to a certain discontinuity in the provision of funds and to a market standstill. As mentioned above, the state financing institute ALTUM is responsible for coordinating the state funding program for the refurbishment of multifamily buildings and for providing the funding. The funding policy itself and the funding program are the responsibility of the Ministry of Economics, while the Ministry of Environment and Regional Development is responsible for the public buildings. It remains a major challenge for the Latvian government, in cooperation with commercial banks, to offer financing that motivates homeowners to make energy-efficient renovations. Ideally, the financing of the refurbishment is possible through the saved energy costs and at the same time the subsidy share is reduced and thus a larger number of buildings are refurbished.

So far, the involvement of private actors in the refurbishment of multifamily buildings, although one of the government's goals, has not worked. The use of ESCOs (Energy Saving Companies) despite various efforts, has not been successful so far, and obviously these are difficult to apply in housing retrofits. In order to motivate homeowners to participate in the state subsidy program for the renovation of multifamily buildings and to overcome the first and essen-

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

tial hurdle of the application, some municipalities support preparation of the necessary documents, such as the energy audit and the technical project. The cofinancing can be up to 50 percent but not more than €1.75/m^2. Since the decision to renovate must be made by a majority of all homeowners together in a homeowners' meeting, this support is very important. Another instrument for the municipalities is the granting of tax allowances for owners in renovated buildings.

Policy Tools

The instruments currently used and those that will be used in the future are a mix of investment support, regulation, information measures, and the promotion of research and development. The most important policy instrument in the housing sector is the use of EU funds together with state funds to encourage residents to obtain (mainly commercial) loans to carry out complex energy efficient refurbishments. This instrument will remain the main driver for refurbishment and can be further optimized and adapted by the Ministry of Economics, the financial institution ALTUM, municipalities, and social interest groups—that is, they can work to gradually reduce subsidies, extend maturities, et cetera.

The obligatory "house files," which provide information on the condition of the buildings and are constantly updated, and certain safety measures, such as regular, legally prescribed inspections of the heating and ventilation systems by owners or owners' associations, can contribute to raising awareness among homeowners.

A proven and successful tool is the campaign "Let's live warmer!" ("Dzīvo siltāk!"), launched in 2010 by the Ministry of Economics when the first state support programme for the renovation of multifamily buildings started. The communication campaign, which was developed to promote energy efficiency in buildings in Latvia, also involves industry associations, companies, and experts. In addition to the administrative and organizational issues in respect to applying for projects and managing multifamily buildings, the information campaign also regularly informs people about quality standards, technologies, and the latest developments in building refurbishment. During the campaign's ten years of existence, several conferences, seminars, workshops, discussions, and publications have been organized at national, regional, and local levels. Two-way communication via social networks was established,

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

enabling direct communication with citizens. The Ministry of Economics organized seminars, conferences, and various discussions, and participated in fairs and exhibitions. The campaign's success can be measured by the steadily increasing number of project applications submitted for funding (Ministry of Economics, n.d.). As part of the campaign, the competition for the "Most Energy Efficiency Building" (Konkursā Energoefektīvākā, n.d.) has been held regularly since 2011, judging buildings renovated in the previous year.

Related Measures

In addition to renovating that part of Latvia's housing stock that can be sustainably renovated, increasing the availability of affordable housing and thus building new apartments and developing a rental housing market are a parallel major challenge for the country.

To expand the housing market on the supply side, more subsidies are required to attract investors for new, energy-efficient (rental) homes, and long-term reform of the rental law must be completed. The Latvian government expects that once the obstacles in the rental market have been removed, around €600 million will be invested annually in new and energy-efficient buildings. New buildings and renovations of social housing are also to be subsidized with state and municipal funds to support low-income people and those on the waiting lists for housing.

The funding and guarantee program for young families to improve access to residential property is to be geared more toward the purchase of energy-efficient apartments. With additional funding, more energy-efficient apartments are to be purchased than previously vacant apartments in the prefabricated buildings.

As part of the national development plan (NAP2027), the increase in the energy efficiency of private houses is to be considered for the first time. Both the legal and financial framework conditions must be created for this.

Conclusions, Challenges, Limitations, Reality of Plans for Decarbonization

The performance of Latvia in respect of housing decarbonization is still modest in consideration of national targets as well as when compared to European in-

https://doi.org/10.14361/9783839467824-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

dices, but insufficient in view of the goal of net zero emissions by 2050. Latvia continues to manage a difficult legacy that started thirty years ago with the mass privatization of poorly maintained and energy inefficient housing, which led to little progress in improving energy efficiency in buildings until recent times due to years of delay.

In the meantime, the basics have been laid for the mobilization of homeowners on the one hand and the practical implementation of building renovation by companies on the other. To achieve higher volumes and higher renovation rates together with a further deepening of renovation, the inclusion of renewable energy and innovations are necessary given the building sector's already emerging limitations of capacity. For example, the approach of carrying out serial refurbishment with prefabricated elements, which started in Estonia and is also spreading in some countries in Western Europe, would increase the renovation rate while at the same time providing opportunities for the local wood processing industry.

Together with improving access to affordable housing for the population, urban development could receive a new impetus. Integrated urban area development and solutions for buildings that can no longer be renovated and whose owners are abandoning them require optimized approaches that help to use scarce financial resources in a more targeted way. The inclusion of EU funds and the new possibilities offered by the EU Recovery Fund must be used even more consistently for national decarbonization. Ultimately, the national building renovation that is now necessary can potentially give substantial and sustainable impetus to the domestic economy and to local growth.

References

CSB (2011). "Housing and Population Census 2011." Online database of Central Statistical Bureau (CSB), Ministry of Economics of the Republic of Latvia. Accessed February 14, 2021. https://www.csb.gov.lv/en/statistics/statistics-by-theme/population/census/search-in-theme/1335-housing-and-population-census-2011-data-housings.

CSCC (2012). National Development Plan of Latvia for 2014–2020. Riga: Latvian Cross-Sectoral Coordination Center (CSCC). Accessed February 14, 2020. https://www.pkc.gov.lv/images/NAP2020%20dokumenti/NDP2020_English_Final.pdf

CSCC (2020). National Development Plan of Latvia for 2021–2027. Riga: Latvian Cross-Sectoral Coordination Center (CSCC). Accessed February 14,

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND

2020. https://www.pkc.gov.lv/sites/default/files/inline-files/NAP2027__ENG_2.pdf.

Dzedulis, Z. (2020). "Sola nodokļu atlaides tiem iedzīvotājiem, kuri paši izremontēs savu daudzdzīvokļu namu." LA.LV (website). December 18, 2020. https://www.la.lv/sola-nodoklu-atlaides-tiem-iedzivotajiem-kuri-pasi-izremontes-savu-daudzdzivoklu-naumu.

Eurostat (n.d.). "EU Statistics on Income and Living Conditions (EU-SILC) Methodology—Housing Deprivation." Statistics Explained (website). Accessed February 2, 2020. https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_statistics_on_income_and_living_conditions_%28EU-SILC%29_methodology_-_housing_deprivation.

Konkursā "Energoefektīvākā ēka Latvijā" (n.d.). Energy-efficiency competition website. Accessed February 14, 2021. www.energoefektivakaeka.lv.

LTRS (2020). Information Report: Long-Term Strategy for the Renovation of Buildings [LTRS]. Riga. Accessed February 14, 2020. https://energy.ec.europa.eu/system/files/2021-01/lv_2020_ltrs_official_translation_en_0.pdf.

Ministry of Economics (2015). Financial Accessibility for Energy Efficiency Improvement in Multi-Apartment Buildings: Ex Ante Assessment. Riga: Ministry of Economics of the Republic of Latvia, February 26, 2015, https://www.fi-compass.eu/sites/default/files/publications/exante-ee-in-multiappartment-buildings-en.pdf.

Ministry of Economics (n.d.). "Latvijā atjaunoto daudzdzīvokļu māju e-karte" [E-map of renovated apartment buildings in Latvia]. Google Maps. User map of completed projects, compiled by the Ministry of Economics of the Republic of Latvia. Accessed February 14, 2021. https://www.google.com/maps/d/u/0/edit?mid=zDrGv9JHdeok.k1y080P1Ier4&ie=UTF8&oe=UTF8&msa=0&dg=feature.

NECP (2018). National Energy and Climate Plan of Latvia 2021–2030: Draft for Submitting to the European Commission for Evaluation. Riga. Accessed February 19, 2023. https://energy.ec.europa.eu/system/files/2019-03/latvia_draftnecp_en_0.pdf.

OECD (2020). Policy Actions for Affordable Housing in Latvia. Organisation for Economic Co-Operation and Development (OECD), 2020. Accessed February 14, 2020. https://issuu.com/oecd.publishing/docs/latvia_housing_report_web-1.

Saeima (2010). Sustainable Development Strategy of Latvia until 2030 (Latvia 2030). Riga: Saeima [parliament] of the Republic of Latvia. June 2010. https://www.pkc.gov.lv/sites/default/files/inline-files/LIAS_2030_en_1.pdf.

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access -

https://doi.org/10.14361/9783839457924-015 https://www.inlibra.com/de/agb - Open Access - (cc) BY-NC-ND