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The Evolution of Multi-Family Housing Development Standards in the Climate Crisis: A Comparative Analysis of Selected Issues

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Abstract: Contemporary problems related to the consequences of climate change and exposure to changing investment and implementation conditions are prompting the development of programmes adapting to climate change. Issues of adaptation and actions in relation to climate change are being discussed in the architectural, urban planning, and governmental communities. Models are being developed for shaping the functional and spatial structure, buildings and infrastructure in the city in relation to the projected climate change. Multi-criteria and interdisciplinary research is being carried out and solutions are being implemented for retaining water, minimising the heat island effect, reducing emissions and environmental impact by analysing the carbon footprint and introducing circular economy principles. The research is focused on the analysis of design and implementation conditions for multi-family housing projects in Poland, and the development of design guidelines enabling adaptation and mitigation of the negative effects of climate change, including heat island effects, smog, overheating, drought, and flooding in housing. Conclusions from the overview of the indicated documents and legal provisions for the implementation of sustainable development principles and adaptation to climate change in the investments under preparation (urban and architectural projects) enable the forecasting of development directions and ideological assumptions for shaping urbanised areas, providing the basis for shaping the resilience of the functional and spatial structure and the natural system in urban areas subject to transformation. Issues of implementing pro-environmental technologies and developing new urban planning standards disseminate the solutions of compact cities in which the development of multifunctional building complexes with public spaces equipped with greenery linked to the buildings are realised.

Keywords: housing standards; climate crisis; humanitarian crisis

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1. Introduction

The dream of creating an ideal space for life has persisted throughout the history of social development. This dream changed under the influence of many events. Wars, epidemics, the development of technologies, and changes in economic conditions contributed to the changes in the perception of human needs and patterns of housing, work,

and recreation [1]. One of the main events affecting the quality of life and its standards today is the climate crisis.

The ideological basis of modern sustainable urban design dates back to the 1970s. In 1975, Richard Register founded Urban Ecology, whose mission was, and still remains, the reconstruction of modern cities towards a natural balance. In 1987, Eco City was defined as "an urban environmental system in which inputs/resources and production/waste are organized". In 1990, Urban Ecology organised the first international Eco City conference in Berkeley. A set of criteria which a model Eco City should correspond to was developed at the end of the 20th century. It should operate on the basis of a self-sufficient economy, use local resources, and have an entirely carbon-neutral energy production from renewable sources. Therefore, the Eco City is a modern sustainable city that takes up the challenge of regeneratively creating urban space while respecting environmental, social, spatial, and economic conditions.

The shaping of urbanised areas in Europe has been influenced by the findings of the urban planning principles adopted by the European Council of Town Planners [2] and the 'Leipzig Charter' on Sustainable European Cities [3]. Directions for the development of European cities were also indicated in the EU Strategy "Europe 2020—A strategy for smart, sustainable and inclusive growth" (COM(2010) 758) and in the EU Climate Change Adaptation Strategy of 16 April 2013 (COM(2013) 216 final). In conjunction with the indicated development strategies and activities of the circles responsible for shaping urbanised areas and natural systems, further guidelines are being introduced for the shaping of cities in Poland.

The Polish Ministry of Infrastructure and Development has published a study entitled National Urban Policy 2023 [4] (the document was adopted by the resolution of the Council of Ministers on 20 October 2015). Problem areas and guidelines are indicated for the interdisciplinary and multi-criteria transformation of cities and urban infrastructure. The issue of shaping guidelines for investment areas in the city is directly linked to the transformation of degraded areas and revitalisation issues. The Law on Revitalisation [5] has been passed.

Sustainable development is one of the three priorities of the EU's Europe 2020 strategy. In this document, the Member States have committed themselves to implementing and achieving sustainable development at all levels of governance—national, regional, and local, declaring actions in three development zones—social, economic, and environmental, for a lasting improvement in the quality of life of the local communities. According to the Climate Neutrality Implementation Strategy, the building sector is scheduled to be completely decarbonised by 2050.

In order to achieve the decarbonising goal in the construction industry, it is necessary not only to accelerate the rate of retrofitting existing stock from 1% to 3% per year, but also ensure that the buildings constructed today are nearly zero energy. The EU's guidelines in Developing the Strategy: Climate Neutrality 2050, a long-term strategy—a vision for a prosperous, modern, competitive and climate-neutral EU economy provide indications for action on economic activities.

In implementing climate neutrality assumptions, it is advisable to prepare investments in the model of sustainable construction, defined by the Polish Green Building Council (PLGBC) as a sustainable building which is economical, comfortable and created with respect for the natural environment. By designing, constructing and using green buildings, we are simultaneously meeting our current needs and ensuring that future generations will also be able to meet their needs. Methods of conserving natural resources and caring for the environment are considered at all life stages of such a building.

CO_2 emissions from the building sector are not just due to the use of buildings, but also include an embedded carbon footprint, i.e., emissions associated with the entire life cycle of a building and its components—from production, through transport, construction, use, demolition and finally, to disposal or recycling. An action to slow climate change, which the building sector has significant influence upon, is the creation of sustainable

buildings that meet energy efficiency standards, are comfortable and healthy for their residents, and respect the environment. Methods of preserving natural resources and caring for the environment are considered at all stages of a building's life. Sustainable design is characterised by high energy efficiency, responsible water management, and high quality of the indoor environment measured by acoustic and thermal comfort levels, access to daylight, ventilation and low levels of air pollutants.

Climate itself plays a minor role in how we design our modern homes, as any space can be artificially altered to achieve indoor comfort [6]. However, this is the biggest problem for ecology. The average temperature on Earth has risen sharply, which leads to global temperature anomalies. Carbon emissions, deforestation, and changes in land use contribute to this issue. The construction industry is considered one of the largest consumers of electricity, as well as a producer of waste that has a harmful effect on the environment [6–14].

Today, the European and global situation in terms of climate and environmental challenges requires special attention with regard to reducing energy consumption and increasing the energy efficiency of buildings. Carbon emissions can be reduced through the widespread use of more energy measures and clean technologies, such as highly insulating building envelopes, heat pumps, photovoltaics, centralised energy, etc. [15,16]. It is possible to increase energy efficiency in the residential sector by using renewable sources instead of traditional energy, as well as by carrying out energy modernization of old buildings. This should not only reduce energy consumption and greenhouse gas emissions, but also allow these buildings to adapt to new regulatory requirements and standards [6].

Architecture in relation to the applicable norms and standards is the art of creating order in the environment. It was assumed that it is a discipline that organises and shapes space in real forms necessary to satisfy human material and spiritual needs. It is, therefore, a reflection of social and economic reality, a specific stage of its forms of development [17]. Contemporary architecture should meet the tasks resulting from both complex forms of life organization, and rapid social and economic changes; it must not only correspond to the conditions of the present times, but also, taking into account social, economic, technical and scientific changes, anticipate as far as possible the satisfaction of different needs in the future [18,19].

Housing is one of the most desirable forms of ownership and one of the most common forms of investment. Therefore, in the climate crisis era, it is necessary to focus considerable attention on improving the quality of housing operation with minimal damage to the environment. For example, green construction is being developed in China to ease the burden of energy consumption of traditional buildings for environmental resources and social development. A green building can save resources (energy, land, water and material saving) throughout its life cycle, protect the environment, reduce pollution, provide people with health, fitness and efficient living space, and coexist in harmony with nature [8]. In Saudi Arabia, alternative energy sources are being actively implemented in the household sector, i.e., photovoltaic systems that work on solar energy [10]. A large amount of energy can be saved with a correct and adequate design of the living space. It is possible to minimise dependence on means for heating and cooling premises if heat and air in buildings are directed naturally [20]. An important role in the construction of buildings is played by the details of architectural structures, especially those that support the continuity of thermal insulation. This is why passive house construction technology is gaining popularity today, not only providing a high level of comfort with very low energy consumption, but being also ecological and safe for the environment [21–23].

Currently, the understanding of architecture includes a number of pro-environmental and pro-climate factors [24], which are taken into account in the design of structures and equipping buildings with technical infrastructure, which is emphasised by global and EU directives. In 2020, the European Commission, as part of the European Green Deal, launched the "Renewal Wave for Europe", the goal of which was to double the annual energy renovation rates of residential and non-residential buildings by 2030, and with deep

energy renovation [25]. In December 2021, the European Commission proposed a revision of the Energy Performance of Buildings Directive (EPBD) as part of the "Fit for 55" package to achieve a minimum 55% reduction in greenhouse gas (GHG) emissions in the EU by 2030 [26].

In Poland, housing policy is conditioned by many local regulations, largely taking into account global and European guidelines [27]. In terms of shaping the housing estates based on the cooperation of architects and developers, there are many factors and trends indicating the positive aspects of such cooperation, expressed in successful and socially recognised construction projects [28,29].

The development industry, or rather construction developers are investors in the private or public sector who invest in the construction of real estate, including residential houses. The whole process, the origin of which oscillates primarily in financial and investment initiatives, aims at the creation of construction utility that, after a wide assessment of possibilities and prospects, will finally reach its recipient. The range of interests and investment opportunities is quite large and the market offers many investment opportunities and variants [30,31].

The aim of this study was to analyse the issues shaping residential architecture based on various standards and demands in the context of the climate crisis. Good features occurring in multi-family housing architecture are emphasised here, and positive examples of functional and spatial solutions are indicated. The study seeks to define various contemporary ways of designing residential architecture, as well as: (1) specify the social, locational, economic, spatial, environmental, cultural and technological conditions reflected in investments and the demand in the context of climate crisis; and (2) characterise the developers' standards, taking into account factors affecting the attractiveness of cultural, environmental, infrastructural, organizational and functional aspects.

2. Material and Methods

During the study, the following investments and investment considerations taking into account the typology of climate change were analysed: Accumulation of heat energy heating and overheating—heat island effect; accumulation of precipitation water through localised heavy rain and snowmelt; drought and periodic limited access to groundwater and lack of rainfall; significant daily temperature amplitudes; accumulation of violent and intense wind flows and changes in the atmospheric pressure system; accumulation of air, water, and soil pollution; accumulation of pathogens, organic pollutants and bacteria; accumulation of stress factors influencing changes in the resilience of urban ecosystems [32,33].

The analysis was based, e.g., on documents providing guidelines for sustainable design and model methodologies described as the Polish Green Building Council's (PLGBC) Green House (pl. *Zielony Dom*) Certification Criteria and the Criteria for Assessing Architectural Executions for Climate Responsible Solutions. Within the Green House certification framework, the analysis and recommended solutions concerned the areas according to the following criteria: Management of the building project; site and location; materials and resources; water management; user health and comfort; and energy optimisation. Documents relevant to the design of contemporary multi-family housing were analysed, taking into account the principles of sustainable development and climate change adaptation, including but not limited to: UN Sustainable Development Goals; European Green Deal Strategy; Communication from the Commission to the European Parliament; Polish legislation; Sustainable Energy Action Plan for Warsaw [34]; Green House Certification Criteria of the Polish Green Building Council (PLGBC); and programmes and standards of the City of Warsaw, including: Environmental Protection Programme and Warsaw Housing Standard.

The presented analysis used two research methods: (1) critical literature overview, and (2) the authors' professional experience of design and implementation work between architects and developers in the multi-family building sector. The specified aspects are based on the issues that arise during the entire process of creating developer architecture objects [35]. The literature overview considered scientific publications that relate to housing

standards and the climate crisis at the same time. The extraction of these publications allowed the results to be formulated with a breakdown of factors: (i) economic, which directly affect design solutions [36,37], (ii) environmental, and (iii) educational issues related to the impact of architecture on the climate crisis [12,38]. As the research was based on examples of good communication between architects and developers, the most positive elements of this cooperation were identified, and their effects used in the designed buildings were specified and described [39,40]. The summary of the results focuses on detailing exemplary aspects related to the social and environmental attractiveness of multi-family architecture in the context of architect-developer collaboration in times of global climate crisis [41].

Specifying the methodological subdivision into construction developers and architects (Figure 1) is justified primarily by a different way of treating individual problems and solutions. By definition, investors will be interested in reaching customers, meeting their needs and requirements from an economic perspective. Architects, on the other hand, will be interested in the general well-being and balance of the designed solutions, which should meet a number of formal and legal requirements, in accordance with the art of construction, with respect for the environment and the satisfaction of future recipients. The different views of these two groups will have conflicts on many levels, but will also be convergent on many issues. The aim of the article is, among others, to highlight only the positive aspects of this cooperation, as well as the separate and individual thoughts, ideas, proposals and practices. The synergy between developers and architects turns into creativity saturated with a multidimensional point of view, and the fruits of this creativity are presented in the form of selected examples that were analysed and drawn on this basis, as well as a summary and list of the best proposals for the contemporary way of designing multi-family buildings. Not only was criticism of the literature review used, but also personal experience resulting from the cooperation of the authors (architects) with development centres. In addition, the professional experience of the authors can be subdivided into scientific and design practice in this area. The scientific work of the authors, oscillating, e.g., in the subject of multi-family buildings, focuses primarily and briefly on: aspects of pro-environmental design, energy-efficient design, sociology and the relationship between architecture and environmental, eco-tech trends. The design work of the authors in the context of this study concerns, e.g., finished conceptual, construction and executive designs of various multi-family buildings: newly designed, modernised, and historic, including historic tenement houses. The considerations and observations resulting from this were taken into account when creating the results and summaries, and based on them, the final conclusions.

2.1. Social Factors

Currently, the most active target group on the market is the 30–40 year-olds (Figure 2a). This requires the creation of new housing standards and new forms of marketing that are able to reach customers. The above statistics indicate that the main target group includes relatively young people, for whom, for worldview reasons, very important factors related to a limited impact on the environment will be of crucial significance when buying a home. Energy-efficient and environmentally friendly solutions will be both a marketing attraction and something very positive in the understanding of the modern philosophy of life, with which many people are increasingly identifying themselves. A factor influencing the change in trends among projects is a new generation that requires the use of innovation. The dominant generation is made up of people (not only in Poland) who have a high level of knowledge about real estate and environmental protection. They are characterised by a high awareness of their needs and insight into the market. In addition, the most important thing for buyers will be the type of the investment, its main theme, style of architecture, additional benefits, landscape formation, as well as greenery solutions [42–46].

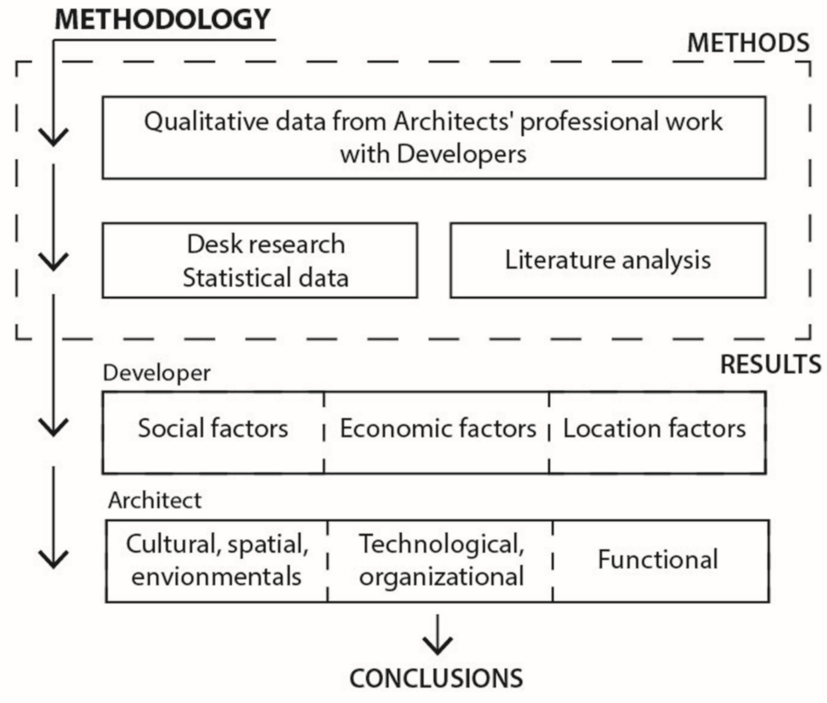

Figure 1. Diagram of the methodology of study.

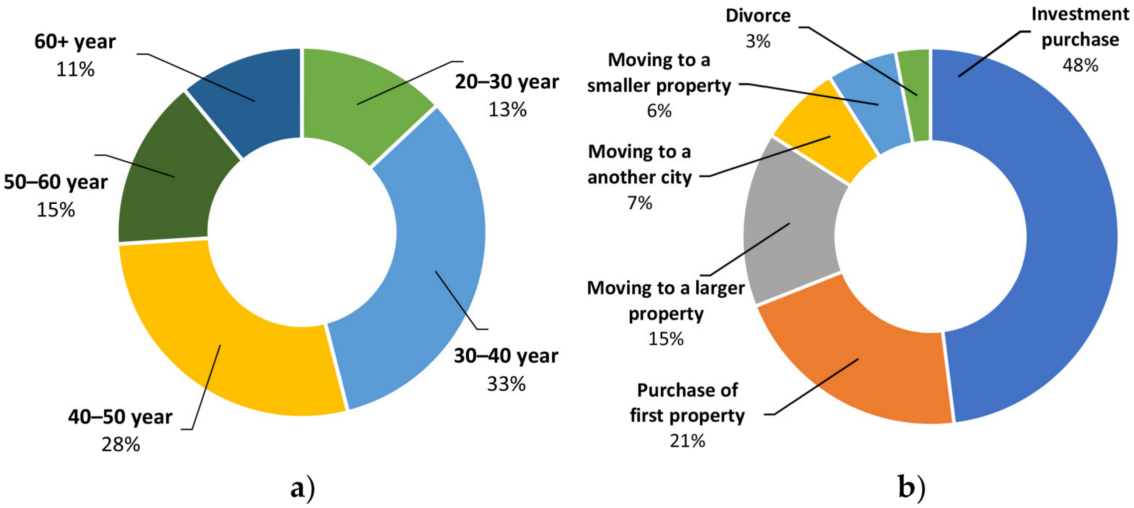

Figure 2. Statistics on the real estate market in Poland in Q4 2022: (**a**) age of housing buyers, (**b**) reasons for buying a property (Profil Kupujących).

The cited report presents information on the age of the purchasers and their derivatives regarding profession, as well as the reasons for concluding the transactions, the preferred area and the value of purchases. Among other things, the study determines the so-called buyer profile, which is illustrated in the graphs. On the basis of these graphs and the information contained in them (Figure 2a,b), it is possible to distinguish the age characteristics of potential recipients of developer apartments. According to the report, the largest group of homebuyers are between 30 to 40 years old, accounting for 33% of the total market. This is followed by the age group between 40 to 50, with 28% of the total, followed by the 50 to 60 age group, with an estimated 15% of the total. Finally, with an equal share of 13%, the age groups from 20 to 30 and those over 60 were defined with a share of 11%. Therefore, purchasers of apartments are primarily people who are on the verge of life changes by choosing new places of residence, enlarging their families with their first or next child, which increases the need to buy a completely new or larger apartment [45].

2.2. Economic Factors

The economic aspects of buying a home are one of the main factors considered by potential buyers (Table 1). The conducted analyses, in addition to indicating the fact that the main participants on the market are young people aged 30+, show that the dominant profession is a full-time employee, with a 44% share in apartment purchases. Entrepreneurs are classified with a much lower share—25%, followed by managers—15%, pensioners—10%, top managers—3%, and finally students, with a share of 3%. The profession can undoubtedly affect the reasons for investing in housing. Further, 48% of people declare with a strictly investment purpose, and 21% with the purchase of their first property. Moving to a new, larger apartment concerns 15% of the respondents, change of urban residence with a 7% share, while moving to a smaller apartment with 6%. At the very end, there is also a 3% share because of divorces. Last but not least, data on the price and area of flats were indicated, which reflect the most frequently chosen properties among particular age groups, professional groups, and by virtue of a purchase decision. The average area of apartments oscillates around 51 square metres, but the apartment area for each of the professional groups separately is also worth quoting in this case. Pensioners choose an average area of 59 square metres, managers—55 square metres, full-time employees—50, and entrepreneurs—51. The largest apartments are chosen by top managers—61 square metres, while the smallest by students—on average 45 square metres [45].

Table 1. Average price and area of property in Poland in Q4 2022 (Profil Kupujących).

Age	**Price**	**Area [m^2]**	**Price per m^2**
20–30	PLN 352,000	46	PLN 7652
30–40	PLN 376,000	54	PLN 6963
40–50	PLN 408,000	53	PLN 7698
50–60	PLN 399,000	46	PLN 8674
60+	PLN 496,000	58	PLN 8552
Profession	**Price**	**Area [m^2]**	**Price per m^2**
Full-time employee	PLN 366,000	50	PLN 7320
Entrepreneur	PLN 374,000	51	PLN 7333
Manager	PLN 450,000	55	PLN 8182
Pensioner	PLN 498,000	59	PLN 8441
Top Manager	PLN 525,000	61	PLN 8607
Student	PLN 370,000	45	PLN 8222
Reason of buying the property	**Price**	**Area [m^2]**	**Price per m^2**
Investment purchase	PLN 376,000	45	PLN 8356
Purchase of first property	PLN 380,000	49	PLN 7755
Moving to another city	PLN 397,000	52	PLN 7635
Moving to a larger property	PLN 470,000	69	PLN 6812
Moving to a smaller property	PLN 473,000	68	PLN 6956
Divorce	PLN 378,000	56	PLN 6750

2.3. Location Factors

One of the indicators helping to assess the potential of a given area is the Migration Balance Index. It is a determinant of places to which the flow of population is at the highest level, which may mean that investing in these locations is worthwhile. Such a study has been prepared by the GUS (Central Statistical Office in Poland), in which data on the migration of residents at the level of the whole country, voivodships, communes, and even

at the level of larger cities can be acquired. The data indicate where people move out and move in [47].

The administrative subdivision of Poland according to the county measure is presented (Figure 3a). There are 308 counties and 65 cities with county laws. Indications of net migration should be understood by the unit of a migrant person in relation to the thousandth population of a given county. (Figure 3b) shows the administrative subdivision of the Mazowieckie (Masovian) voivodship according to the measure of communes. In this voivodship, there are 42 counties and 5 cities with county laws, which are divided into 314 communes. Indications illustrating the net migration should be understood as the unit of a migrant person in relation to the thousandth population of a given commune.

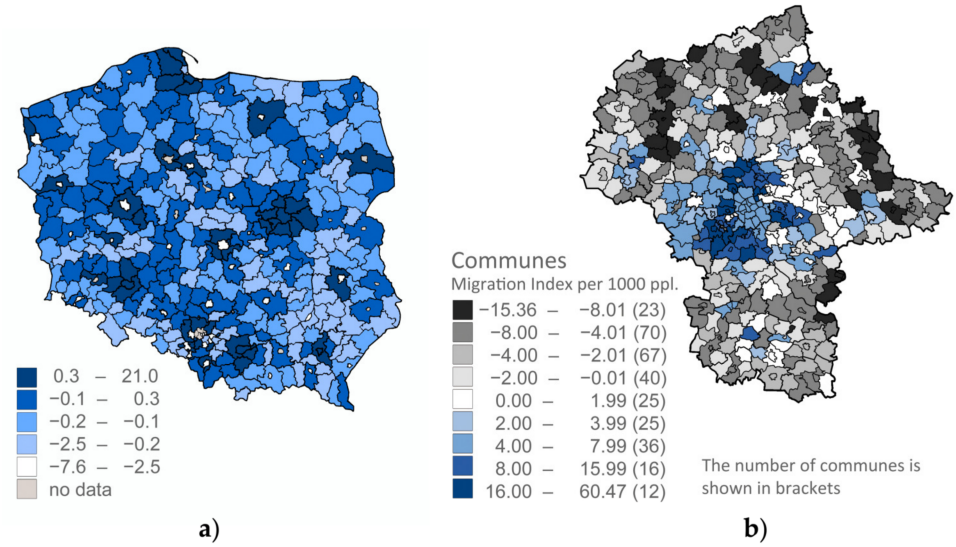

Figure 3. (**a**) Migration Balance Index in Poland for 2021, based on data available from the GUS; (**b**) Map of migration for permanent residence in the Mazowieckie (Masovian) voivodship for 2019, based on data available from the GUS [47].

3. Results

At this point, the current state of the construction market in Poland is worth presenting, by showing what problems it is struggling with and how this issue translates into the sale and construction of apartments (Figure 4). The data show that there is a certain crisis in the real estate development industry, which may affect other sectors of the economy. However, despite this, the developing Polish construction sector is still causing an oversupply of housing. Based on the GUS data, the number of households in Poland in 2021 was 14.811 million, while the number of completed apartments was approximately 15.616 million, which resulted in approximately 0.806 million excess apartments than needed for households. However, these figures do not include refugees, tourists, students, and immigrants. An attempt to estimate the exact sum of these groups is difficult, but may lead to the conclusion that the oversupply is not that large. Expert forecasts from the EKF (European Financial Congress) state that in 2023, Poland's economic growth may slow down to about 0.5–0.8%, compared to about 4.6–5.1% in 2022. In their opinion, the factor contributing to the downward trend is the housing market, which has been in poor condition since the pandemic in 2020. Developers are significantly limiting the number of new investments, which means that the number of flats available for sale this year will decrease. The reasons for the lower number of construction sites include: poor availability of bank loans; collapse in the housing demand; rising costs of materials and services; negative economic balance; and division of the investment into smaller stages. In 2022, developers built nearly 30% less apartments than in the same period of 2021. This will result in a decrease in the number of finished units available for sale in 2023 and 2024. The development market is a very important segment of the economy, related to many other industries. A decline in this

sector will affect the entire economy and the labour market. According to a report by PKO BP analysts, the average transaction prices of apartments in the first half of 2023 will be lower than in the first half of 2022, and the reasons for these downward trends will be primarily: a decrease in credit demand for apartments due to high interest rates; factual decline in earnings of the population; oversupply of flats in a situation of a large number of projects launched before the pandemic period; and an increase in the expected rates of return by the investors. According to experts, a certain brake on the decline in housing prices will be: the still high rental rates; slow recovery of lending; and gradual demand among the refugees from Ukraine [47–50].

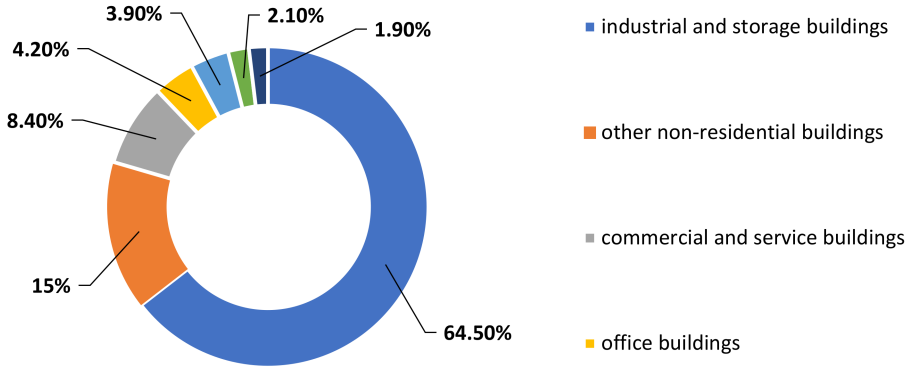

Figure 4. Structure of usable area of non-residential buildings commissioned in Q1 2023. Data available from GUS.

In the first quarter of 2023, 5.4 thousand new non-residential buildings were commissioned and 595 were extended (by 4.5% and 1.8% less than in the previous year, respectively). The total usable area of new and extended non-residential buildings amounted to 4.5 million square metres, 6.1% more than in the corresponding period of 2022. Industrial and storage buildings (64.5%) prevailed in the structure of completed space. Other non-residential buildings (15.0%), and commercial and service buildings (8.4%) also had significant shares. An increase (year/year) in the area put into use was recorded for: industrial and storage buildings (by 23.4%), hotels and tourist accommodation buildings (by 8.9%), and transport and communication buildings (by 0.2%) [51].

In the first three months of 2023, the construction of 38.6 thousand apartments began, i.e., 14.7 thousand apartments (27.6%) less than in the previous year. Dwellings built for sale or rent accounted for 60.7% of the total, and dwellings in individual construction—38.0%. The remaining dwellings were recorded in the cooperative, communal, social rental, and company forms of construction. In the discussed period, building permits were issued or notifications were made with a construction project for the construction of 52.1 thousand flats, i.e., 25.9 thousand flats (33.2%) less than in the previous year. The average projected area of a flat was 87.9 square metres, which meant a decrease by 2.2 square metres compared to the first quarter of 2022. The planned average area of flats in single-family buildings was 130.0 square metres, and in multi-family buildings—52.9 square metres (Table 2). Taking into account the structure of the number of dwellings for which building permits have been issued or a construction project has been submitted, by type of construction, the largest shares were recorded for constructions for sale or rent (66.6%), and individual constructions (30.0%). The remaining flats will be implemented in the cooperative, communal, social rental, and company form of construction.

Table 2. New residential buildings with building permits issued or with a construction project submitted in Q1 2023. Data available from GUS.

Itemization	Building Permits and Notifications of Buildings	Buildings	Flats	Usable Area in Total [m^2]	Usable Area of Flat [m^2]
Total	16,831	21,294	50,820	4,465,847	87.9
Single-family buildings	16,432	20,604	23,044	2,995,450	130.0
Multi-family buildings	399	690	27,776	1,470,397	52.9

3.1. Ways of Influencing the Design of Multi-Family Buildings in Poland by Developers

3.1.1. Social Factors

The social context may be included, e.g., in the so-called lifestyle, which determines that the attractiveness of the apartment is also created by the chosen philosophy of life and emotions, which become an easy identifier. It is possible to distinguish among developers the tendency to categorise a given investment thematically so as to reach a specific target group, taking into account additional design solutions [46,52].

An example of such a project is the Centrum 50+ housing estate in Gliwice, Poland, dedicated mainly to seniors. The complex of facilities is designed for the elderly and for people with disabilities, with buildings adapted to their unique needs, equipped with new technologies, services, catering, and administrative premises, as well as an outdoor gym [53]. Another alternative to thematic marketing is the concept of a housing estate that gathers mainly a religious community. The project called Housing Estate Only for Catholics was supposed to be the first such project in Poland. It includes the creation of a "Family estate" intended for a specific social group, together with the graphic identification and PR strategies [54].

The graphic identification of the building, its interiors and semi-public spaces is another distinguishing feature of modern housing estates. Developers decide to meet the requirements of potential buyers, which is why they try to make their investments stand out with individuality and ideas. On the example of the modernization of a modernist tenement house at Lubomira 6 Str. in Warsaw, the developer decided to give the investment a cinematic theme. This is reflected in the unique designs of the corridor floors consisting of a monochromatic film-strip mosaic. In addition, the corridors were decorated with graphics and floor indicators in the form of "film claps". The dominant feature and the most characteristic identifier is a large-scale mural depicting a film camera with a reel, painted on one of the blind walls. In the contemporary development point of view, there are also various types of identifying motifs, repeating colour palettes, logotype designs, and unique solutions identifying a given place, which may be easier for future residents to assimilate with.

3.1.2. Economic Factors

The area of flats purchased will change for those who need a flat for strictly personal or investment purposes, depending on the budget they have, the period during which they will use the property, and the profession or social status to which they qualify. The issues of development and design economics should harmonise with the initial assumptions, the possible theme of the investment, its status, or target social groups. These findings will also result in such information as the level of the required finish standard, and a multitude of alternative technological, material, functional, and spatial applications [55].

It can be assumed that the subject of potential housing development is also able to be determined around another completely arbitrary category of the purpose of people—only young residents or only with children, multi-person families, or around those who are looking for their investments in the real estate market for the purpose of their rental (short or long-term), taking as examples the target groups of students, tourists, or workers. It is more often obligatory to give a clear direction to the shape of a given project thematically

in terms of marketing and planning, even in terms of economics and the finishing standard of a given property [56].

According to Kuba Karliński, an experienced investor and expert in multiplying money on real estate, various potential investment categories are distinguished, and the main and most common are flats for rent, quick sale of flats, commercial premises, tenement houses, development projects, and land investments [57]. One of the most frequently chosen forms of investment is residential property, which is an attractive form of investing capital for as many as 75% of Poles [57–59].

3.1.3. Location Factors

The location of the property is one of the key factors distinguishing features that allow matching the apartment to a specific group. Employees of large companies will be looking for apartments in guarded housing estates located in well-connected areas that allow quick access to work or business meetings. Social groups such as students will be interested in the proximity of the apartment to university centres or libraries. For tourists or commuters from outside the city, as well as refugees (in the context of sudden geopolitical change), locations with well-planned and fast communication, railway stations or public transport hubs will be desirable. An important location factor is also the relationship of a given place with the tourism industry, which may determine the investment value in the context of seasonal rentals [57,60].

The phenomenon of urban sprawl, which is associated with the economic and social development of countries or cities [61], affects the changes in the popularity of housing estates near workplaces or factories in the suburbs. It is explained that with the development of public transport, people no longer have to live right next to factories, and they can get to work at an acceptable time from a distance of several dozen kilometres [57]. According to migration data in Poland compiled by GUS, since the early 1990s, most people move towards large cities. A phenomenon on the migration map of Poland is the vicinity of Warsaw, which is the only metropolis in Poland that still has an increasing population, which is continuously spreading out; and according to demographic forecasts, this trend should continue for a long time [47]. Location aspects that will affect investment decisions and design solutions include:

- Transport infrastructure and distance to workplaces or the city centre;
- Landscape values, environmental cleanliness, noise level, climate security;
- Presence and type of neighbouring buildings;
- Availability of recreational, entertainment, commercial, service, educational, or health facilities.

3.2. Ways of Creating Attractive Residential Architecture

Cultural, Spatial, and Environmental Factors

A more diversified program offer with solutions that in reality will not only be a form of marketing is worth proposing (Table 3). In the cultural sphere, it seems a good idea to organise social workshops, educational activities, all kinds of creative meetings, or other forms integrating the local community. Integration of the local community is a phenomenon that is lacking nowadays and its growth is worth investing in by generating creative thought. The answer will be planning solutions for the designed common space, which the residents will be happy to use, relax, and integrate in [62].

Table 3. Cultural, spatial, and environmental factors—a list of issues in the context of ways of creating attractive residential architecture. Based on a critical literature review, knowledge and design practice of the authors.

Space
▪ Organization of shared private or semi-public space in a cultural context; ▪ Proposals for recreation, sport, learning, integration, and rest; ▪ Adaptations of design solutions for specific social groups;
Greenery
▪ Prevention against excessive violation of the environment in the investment process; ▪ Using the potential of existing nature for design purposes; ▪ Planting trees and shrubs, and supplementing the natural environment; ▪ The use of system solutions for green roofs; ▪ Covering vertical elements of buildings with vines, ivy, moss, or algae; ▪ General intensification of the biologically active surface.
Water
▪ Creating rain gardens in the ground and in containers; ▪ Organizing basins and retention ponds; ▪ Unsealing the surface that does not allow for natural vegetation; ▪ Use of hardened structural and permeable substrates; ▪ Creation of absorbent wells; ▪ Use of open rainwater drainage systems; ▪ Use of rainwater retention systems for irrigation purposes.
Sun
▪ Using passive solutions for sun protection; ▪ Utilizing the energy potential of solar energy.

An example of an ideological development solution is the "Art City" housing estate in Kraków, Poland, where the leading theme of the investment is culture, and the motto is "to live with culture". The investor decided to implement the idea of a city of art by organizing a series of artistic workshops for children, exhibitions, culture clubs, and film screenings. These activities focus on the integration and contact of various social groups. As a result, information about the investment reaches people who are interested in buying an apartment, but who are also sensitive to art and want to communicate with it every day [63].

Another valuable aspect in organizing space is the environment. An example of a single-family housing estate is in Nowa Wola, Poland, where during the autumn season colourful bird booths were hung on the wall surrounding the construction site, through which the visualisation of the object could be seen by looking inside the hollow. This composition was a preview of the educational campaign "Novisa Garden—Patron of Nature", under which over half a thousand students from local primary schools and kindergartens took part in free lectures about nature, ornithology, and measures of protecting local fauna and flora. The choice of this type of campaign initiated a dialogue about local nature [46].

The basic issue in the context of nature protection is to prevent the destruction of the existing greenery. An area rich in natural vegetation should be interfered with as little as possible. It is advisable to revitalise it, and to create the main theme of the estate project from the existing landscape value. It is important to create a so-called ecological minimum plan. The assumptions of such a plan may include the use of horizontal and vertical surfaces of buildings, to cover them with vegetation. A good idea to protect buildings from overheating is to use all kinds of vertical and horizontal green surfaces, such as façades covered with ivy or roofs with a biologically active surface, also performing a water retention function. This is a particularly attractive and desirable proposal for the top floors of the building due to the prevention of the negative effects of droughts [64].

Currently, solutions using existing greenery or terrain conditions are preferred to organise rainwater retention systems. These include the process of planting trees and

shrubs, the creation of green areas, the use of green walls and roofs, the creation of rain gardens in the ground or in a container, the creation of basins and retention ponds, the unsealing of surfaces and ground, the use of permeable paved surfaces, and the use of absorbent manholes and open rainwater sewage systems [65].

3.3. Technological and Organizational Factors

Technology, in the sense of solutions used in constructions, is an extremely extensive and dynamically changing issue. However, it is possible to distinguish individual fields or technological issues that have a strong relationship with multi-family housing (Table 4). These solutions can be attractive for customers looking for new alternatives available on the housing market. A certain technological aspect is the possibility of using the potential of virtual reality for a better, more intuitive presentation of the offered architecture, which may contribute to the development of the possibility of personalizing architecture for its users [66].

In the future, thanks to virtual reality technology, it will be possible to change the appearance of the apartment interior according to a personalised idea. This is a definite step towards a completely new quality of modern architecture presentation, as well as streamlining the stage of planning, execution, renovation, and thus, perhaps even reducing material expenditures, which may have a positive impact on the environment [67]. VR is a technology worth investing in for reasons including: faster return on investment by decision-making time reduction by up to 30%; faster verification; better communication with the client; replacement of 2D drawings (paper savings) with an interactive spatial model; increasing competitiveness through visually impressive product presentations; greater efficiency; ease and speed of introducing possible changes in the project; possibility of using mobile devices such as tablets, smartphones, or even special goggles. Architects are also increasingly choosing a BIM (Building Information Modeling) software system, which has a positive effect on understanding and shortening the time of introducing certain arrangements, especially using platforms based on the Internet Cloud System [68]. By working on a single model, companies involved in the design, construction, and management of a building can significantly increase their efficiency and reduce errors throughout the documentation process. Digital design data combined with innovative parametric information modeling technology gives significant advantages over traditional design and building methods [69].

The willingness to use certification in the construction industry is being demonstrated more and more often. Ecological solutions, including buildings with environmental certificates, are just entering the market and usually concern investments carried out at a higher standard, in which apartments are offered at a higher price. In such projects, emphasis is placed on the consumption of thermal energy. Gravitational ventilation in apartments is considered ineffective, so it should be replaced with a mechanical system with pressure diffusers. Thanks to this, air exchange is more suited to the real needs of interior ventilation, and reduces heat loss. The use of energy-saving LED lighting in common areas is also distinguished. Other solutions used include: solar collectors, photovoltaic panels, ground heat exchangers, filters and anti-smog vegetation, rainwater recovery and irrigation systems, environmentally friendly materials, hygienic certificates, heat recuperators, highly efficient heaters, or quality window frames. The certificates used in constructions include, e.g., BREEAM, "Wymogi Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej" (Requirements of the National Fund for Environmental Protection and Water Management), ISO 14001 [70–73].

Table 4. Technological and organizational factors—a list of issues in the context of ways of creating attractive residential architecture. Based on a critical literature review, knowledge and design practice of the authors.

Computer Technology	
▪ Use of VR technology for better presentation, creation of concepts, personalization of projects; ▪ Use of BIM technology to multiply organizational possibilities, reduce costs, time, and problems in the investment process.	
Pro-environmental certification	
▪ BREEAM; LEED, GREEN BUILDING (PLGBC); ▪ Requirements of the "NFOŚiGW" (National Fund for Environmental Protection and Water Management); ▪ ISO 14001.	
System technologies	
▪ High-quality window and door elements with a low heat transfer coefficient and a high level of acoustic insulation; ▪ High-quality building thermal insulation materials; ▪ Filters and anti-smog plantings; ▪ Environmentally friendly building materials with hygienic certificates; ▪ Organization of small fauna and flora ecosystems; ▪ Infiltration systems; ▪ Rainwater retention systems for land irrigation; ▪ Charging stations for electric cars; ▪ High-quality heating systems; ▪ Mechanical ventilation with a recuperation system; ▪ Pressure diffusers; ▪ Automatised LED lighting systems; ▪ Photovoltaic solutions; ▪ Installations of ground heat exchangers; ▪ Gas installations—as a still attractive and efficient variant.	
Passive architectural sun protection solutions	
Location of the building	Appropriate to the existing buildings, urban tissue, cardinal points, shape and surface of the plot.
Architectural form	Location of the building as appropriate in relation to the existing buildings, urban and law factors, orientation of the cardinal directions, shape and surface of the plot.
Interior spaces	Making the best use of the conditions for lighting interiors with daylight, using a number of illuminating elements and spaces such as atriums, passages, galleries, curtain walls with large glazed surfaces.
Functional arrangement	Appropriate for recognizing the thermal needs of the functional division of the building, in accordance with their intended use, specifying day or night zones.
Façades	Taking into account the energy demand so as to minimise losses and maximise the acquisition of thermal energy from the sun.
Passive material sun protection solutions	
Glazing elements	Tinted glass, glass with reflective solar control coatings, double-function glass, printed glass, glazing with light diffusing systems, and solar control glazing with variable properties.
Shading elements	Shading elements such as roller blinds, marquises and marquiselets, external and internal lamellar blinds, louvres sunscreens, shading and light sun-shading shelves, shutters and automatic control systems for mobile elements.
Finishing elements	Finishing materials as reflectors and light absorbers including specific ones whose surfaces are characterised by high values of the solar radiation reflectance coefficient and those with photoabsorption abilities.
Building materials	Building materials as a thermal mass including those that form building elements that do not constitute thermally insulated building partitions, and are so massive that they perfectly play the role of heat accumulation.
Greenery	Greenery as an excellent option when used in the form of shading elements or in the case of the so-called biotic roofs or walls—they naturally reduce the temperature and the heating of building elements.

Gas producers and suppliers seem to be convinced that gas installation is still attractive, this fuel being cheap and safe. It is stated that there is no problem with building a gas connection where the appropriate infrastructure is present, as evidenced by the annual increase in the number of new connections (Table 5). Natural gas can be replaced by many other energy carriers: centralised heat, electricity, fuel oil, or solid fuels such as coal, coke, briquettes, but in the long run, gas is one of the cleanest ecological energy carriers, the use of which is very profitable [74]. The interest in having a gas installation among dwelling users is confirmed by the fact that the share of dwellings with a municipal gas installation connected to the market has remained relatively constant over the years; research carried out again in 2021 showed that this indicator increased to 57.2%. This may indicate that the potential of using gas for heating and utility purposes is still worth considering.

Table 5. Changes in the number and share of houses and premises connected to the gas network in Poland in the years 1999–2016, and 2021, based on GUS.

Year of Research	Number of Houses and Premises with a Gas Connection (in Millions)	Number of Premises and Houses in Poland (in Millions)	Percentage Share of Objects with a Gas Connection to the Number of Houses and Premises in Poland
1999	6.61	11.76	56.2% -
2000	6.72	11.84	56.8% ↑
2001	6.83	11.95	57.2% ↑
2002	6.87	12.44	55.2% ↓
2003	6.98	12.60	55.4% ↑
2004	7.03	12.68	55.4% -
2005	7.09	12.78	55.5% ↑
2006	7.15	12.88	55.5% -
2007	7.24	12.99	55.7% ↑
2008	7.31	13.15	55.6% ↓
2009	7.51	13.30	56.5% ↓
2010	7.60	13.47	56.4% ↓
2011	7.65	13.59	56.3% ↓
2012	7.71	13.72	56.2% ↓
2013	7.77	13.85	56.1% ↓
2014	7.80	13.98	55.8% ↑
2015	7.86	14.12	55.7% ↓
2016	7.92	14.27	55.5% ↓
-	-	-	-
2021	8.77	15.34	57.2% ↑

Another characteristic technological trend in Poland is the turn towards renewable energy sources. Undoubtedly, this is the result of EU policy. In the Renewable Energy Directive rules for the EU, the European Commission set out to achieve a 32% renewables target by 2030 [75]. As a result, in February 2021, the "Energy Policy of Poland until 2040" was adopted ("Polityka energetyczna Polski do 2040"; PEP 2040) [76]. On this basis, a slow departure from coal as the main energy fuel is assumed in favour of renewable energy sources. According to the data of the Energy Market Agency, between January and November 2022, renewable energy sources generated over 31,000 GWh of electricity in Poland—this means a 125% increase compared to the result from 2021. In November 2022,

the capacity of all energy sources in Poland amounted to 60 GW, as much as 22 GW (36%) of which came from RES [77].

The goals set in the Renewable Energy Directive are to be attained primarily through the development of PV systems and off-shore wind farms. Photovoltaics has the largest share in the energy transformation. As much as 53.4% of the electricity generated from renewable sources in Poland relates to electricity from solar radiation (by comparison, the share of wind energy amounts to 36.4%) [77]. In PEP 2040, it is assumed that there will be a significant increase to 5–7 GW in 2030, and 10–16 GW in 2020 in the capacity of PV systems [76]. Poland is now one of the Top 5 solar PV investment markets in Europe. In 2021 alone, the country added around 3.2 GW of solar PV installations (Figure 5). With a cumulative installed solar PV capacity of 7.1 GW at the end of 2021, Poland is now a major European solar energy market, with many investors developing large-scale projects far exceeding the 100 MW project scale [78].

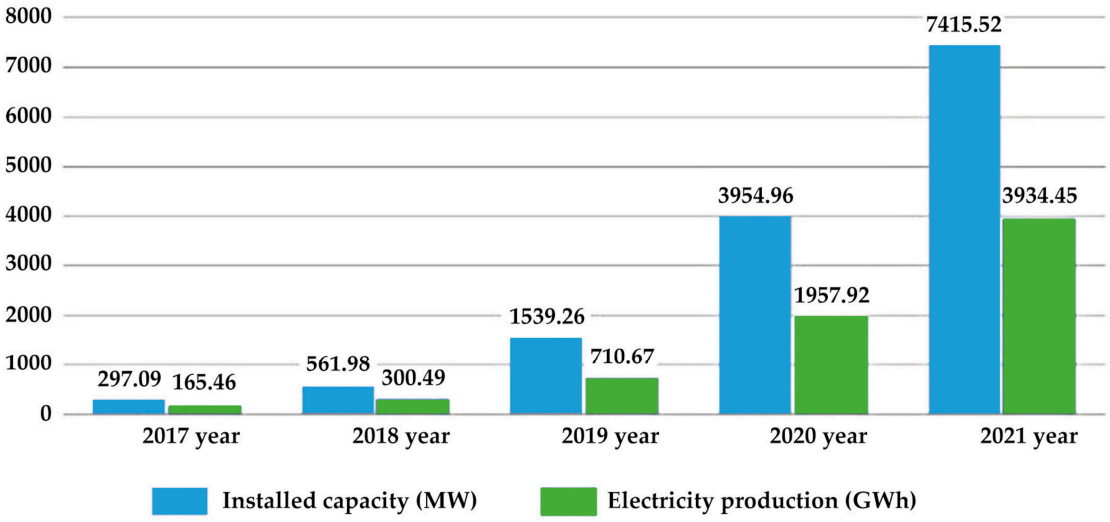

Figure 5. Installed capacity and electricity from photovoltaic cells in Poland between 2017 and 2021 [79].

Despite the barriers resulting from economical aspects, i.e., high initial investment costs, the dynamic development of photovoltaics in Poland is undoubtedly largely due to governmental and local programs that encourage the use of PV in buildings through various forms of financial support. The government program "My Electricity" ("Mój Prąd") launched in 2020 and addressed to individual recipients, i.e., owners of single-family buildings, turned out to be a great success. During the first two editions of this program, almost 3 of 70 MWp PV capacity was installed [80]. This is more than twice as much as expected in the EU study of 2017 residential solar PV capacity by 2030 for Poland (151 MWp was assumed) [81]. The success of this program resulted in extending the forms of support to multi-family buildings—cooperatives and housing communities. In 2020, an equivalent of the "My Electricity" program was launched, a program dedicated to multi-family buildings—housing communities and cooperatives under the name "Słoneczne Dachy" ("Solar Roofs"). The program, supported by the Voivodship Fund for Environmental Protection (WFOŚ) in Poznań, was dedicated to multi-family buildings located in the Wielkopolskie Voivodship. Although it did not repeat the success of the "My Electricity" program, it became a valuable experience, highlighting the problems arising from the differences between individual and community prosumer recipients. The analyses showed that the reason for the relatively low interest was primarily the limitation of the possibility of using the electricity produced only for the needs of common parts of buildings, excluding the individual needs of owners of residential premises, which had a significant impact on the extended payback period [82]. In the current year (2023), a modified program addressed to multi-family buildings was launched—it is already a national government program

called "Tenant Prosumer" ("Prosument Lokatorski"). Cooperatives, housing associations, as well as local governments with multi-family buildings will be able to apply for subsidies for photovoltaics. The budget for subsidies to investments in RES is over PLN 448 million (~EUR 100 million) [83].

The immense interest in photovoltaics in Poland, including residential housing, results mainly from the interest to save money in the conditions of increasing prices for energy from conventional sources. However, it is also a manifestation of ecological awareness, aimed at reducing the carbon footprint in the entire process of using buildings, as well as striving to stimulate the economy not only on a national but also local scale [84]. Another important factor related with the application of RES technologies is the passive building design. The shape of the building and the choice of architectural and material solutions are of great importance for the energy processes taking place between the building and its surroundings. In addition, one of the most important issues (in this regard) is the penetration of solar energy through external partitions into interiors; with regard to the Polish climate zone, solutions should be sought that allow the maximum use of heat and sunlight in the cold and transitional periods, and provide protection against their excess in the warm periods. Overheating of buildings can be prevented, e.g., by passive solutions. In multi-family buildings, the greatest threat is excessive solar gain. Passive solar solutions are building elements the shape of which, as well as the appropriate location in relation to the sun, creates a system aimed at the optimal use of solar energy for natural air conditioning and lighting of the internal space of the building or its fragment. In the thermal aspect, these solutions draw solar energy using its natural physical phenomena, without the need for power from an external source. This means that their role is not only the natural use of heat from insulation, but also the protection against its excess. There are two main groups of solutions that passively contribute to reducing the risk of room overheating. These include spatial solutions, as well as material and construction solutions. The passivity of spatial solutions can be defined by the location of the building, its form, the arrangement of internal space, the layout of functions, and the façade cladding. Passive building protection against overheating includes material solutions that can be briefly divided into: glazed elements, spatial shading elements, finishing materials, insulation materials, and greenery and landscaping [85].

Functional Factors

One of the current trends in broadly understood housing utility is co-living, the intention of which is to create targeted support for integration at the social level. In addition, it is important to provide residents or employees with a program offer that is based on the economy of sharing space, combining the residential function with recreation, work, and basic needs. This leads to the promotion of interpersonal activity and integration in leisure time [18].

The idea of shared workspaces has been very well received in Poland, especially if the presence of co-living is combined with co-working. This is a very common trend in the context of global change or sudden geopolitical changes, potential cataclysms or social threats. Thanks to the possibility of organizing work in the place of residence or its vicinity, certain threats or nuisances may be eliminated. It may also have a positive impact on the reduction of car traffic and less frequent use of public transport, especially during rush hours. This may also have benefits on a purely social level, because due to remote work, the private time saved can be used for healthy activities [86].

Buildings should have spaces for meetings, celebrations, or networking events. Finding oneself in an environment of similar people creates ideal living conditions, and for apartment users it will also be a cheaper alternative to classic rental in the city centre. Research and practice show that Poles are looking for slightly smaller apartments, and at the same time, they are ready to pay for additional functions. Individual projects in the co-living trend include intelligent control systems, parcel lockers at receptions, assigned places for bicycles, or chargers for electric cars in garages. JLL's research shows that every

fifth respondent is more likely to buy an apartment in a housing estate with services such as a self-service laundry with a drying room, a scooter for minutes, or a parking space for a rented car. The presence of these paid services is expected to be more relevant to buyers over the age of 45 [87].

Factors that influence the way flats are shaped (Table 6) include such phenomena as new diverse attitudes and views, e-work, and the crisis of the traditional family. There are three main, general types of multi-family housing that follow the spirit of the times and adapt to the dynamically developing society. These include: a dependent apartment, a flexible apartment, and a comfortable apartment. In addition, the types of multi-family architecture are defined thematically. Global, green, spectacular, defensive, mobile, dynamic, vernacular, and the so-called architecture of deconcentrated concentration are specified [88]. Not all people are interested in buying premises in buildings characterised by the so-called higher standard of finishing, technology, or functional and spatial solutions. This group is dedicated to houses described as "accessible". It is a vernacular architecture, restrained and with a traditional form of development. These houses are cheap to build and operate [89].

Table 6. Functional factors—a list of issues in the context of ways of creating attractive residential architecture. Based on a critical literature review, knowledge and design practice of the authors.

The Idea of Social Integration/Co-living/Co-working Attractive solutions for employees, young and middle-aged people, students and graduates. These groups will be interested in alternative proposals which may additionally be a cheaper form of rental. Very important trends in modern times, in the face of threats and geopolitical changes. Integrated forms of amenities and accompanying services will be offered near the buildings.	
Characteristics of contemporary apartments [88]	
Dependent apartment	Defined by the new philosophy of life of people whose everyday life is often limited by traditional forms of spending time, eating, or cleaning. These needs can be met outside the place of residence, using the local environment.
Flexible apartment	Prone to making spatial changes in them during their inhabitation, which will result in the minimization of structural elements, walls, columns, and shafts. The functional layout of these flats may be easily changed.
Comfortable apartment	Striving to reproduce the comfort of everyday life characteristic of single-family housing, which means that the standard and size of individual premises will be high. Large gardens are common, and apartments are sometimes multi-level, with access to elements such as mezzanines, spacious terraces, balconies, and verandas.
Types of contemporary multi-family architecture [88]	
Global	Fits in with the topic of unification of world architecture projects through the traditional, local, regional, or national context.
Green	Concerns the idea of sustainable development by subordinating multi-family housing to the natural environment and exposing pro-ecological solutions.
Spectacular	Characterised by unconventional, effective architectural forms, focused on publicity and image success.
Defensive	Tends to create defensive and protective forms against all external factors; shapes partitions and building elements with a specific, solid barrier character.
Mobile	Departs from the fixed and traditional spatial context, characterises buildings with easy disassembly and the possibility of assembly in another place.
Dynamic	Negates the static forms of residential development and introduces new, dynamic ones, which sometimes reflect the current technical possibilities.
Deconcentrated concentration	Opposes the proposals of concentric forms and creates loose, deliberately broken structures. Single flats or their fragments will have a shape and a definitely multi-element character.
Vernacular	Being modest, simple, restrained, resulting strictly from the demand and universality of housing needs. Corresponding to the requirements of the majority of society.

Table 6. *Cont.*

The idea of accessibility [89]
The essence of this idea is mainly the lower costs of renting apartments, which in turn depends on the costs of construction and maintenance, which result from design solutions. This will force the use of staircase-free house solutions, the limitation of common areas, staircases, the concentration of installation risers, and the flexibility of functional layouts. The blocks of the buildings will be characterised by compactness, which is important from the point of view of energy saving and care for the environment. The concentrated nature of the development on the plot may be necessary to implement the accessible house model.

4. Discussion

The presented principles related to designing and investing within residential architecture refer to the situation and expectations in Poland. It is worth noting that the described strategy of conduct, taking into account close cooperation between the architect and the developer, is in line with the principles of conduct expressed in EU law [90–92] and is reflected in the policies of other European countries [93–96]. The described factors and requirements related to the quality of architecture are part of a broader policy of searching for appropriate aspects, the presence of which would guarantee the appropriate level of architecture, while ensuring its economic profitability [97,98]. In addition, the presented content refers to the challenges and opportunities related to shaping contemporary architecture [99]. Aspects related to market expectations presented herein concern local specificity, but also reflect a global trend related to specialist housing needs [100]. The proposed division into types of contemporary architecture reflects the current social conditions and expectations of different age groups related to living. The idea of co-living is part of a similar trend related to sharing, which is currently an important element of everyday life and lifestyle, visible both in everyday functioning, for example, in the social media system, and the organization of life integrated around them, and consequently, in housing systems [101–103]. Ideas related to reaching individual social or religious groups are implemented all over the world and are nothing particularly original on the European market, but they draw attention to a certain opposite trend, where despite widespread appeals regarding the inclusiveness of space, areas that are exclusive in their own way are still being sought to meet the expectations of specific customer groups [104,105].

In order to find the most optimal unified model of a modern, comfortable, compact and environmentally friendly model of a residential unit, it is necessary to consider the residential cell on three scales:

- private space (apartment or single-family house);
- communal spaces (staircases, elevator units, corridors, basements, and utility rooms);
- public space (objects located in the nearest surroundings that represent added value, such as public service facilities, green areas, parking lots, etc.).

The more services and amenities are available around a private space or a separate residential unit, the less is the need for the volume and multifunctionality of the internal private space of the apartment itself. The validity of this hypothesis can be traced to the example of Warsaw—in the latest project of the Warsaw Studio [106], urban solutions are mainly focused on polycentricity (creation of independent, fully functional local centres within 15 min of walking (or cycling)), multi-family housing development, and sustainable solutions that help to decrease transport emissions, and reduce the need for residents to use individual and public transport.

Recently, the trend of Poles purchasing homes with larger living spaces is increasing, which is not only caused by the desire for more comfortable living space, but also reflects the effects of the pandemic when residents were able to work remotely, as the need for office space has fallen sharply. In itself, this trend can be seen as positive, as staying at home saves a lot of time on the daily commute and reduces the carbon footprint, which is still one of the largest environmental problems in modern society. A striking example of this trend is the office complex in Warsaw's Mokotów district (the so-called "Mordor"), where a decision was made to demolish several office complexes and build residential buildings.

The pandemic has forced us to rethink the value of private territory for full-fledged isolated living and the need to create an optimal, not a minimum, level of comfort in the living unit.

Therefore, along with the need to minimise the heated space of residential apartments, attention should be paid to the following factors that minimise the need to use private space:

1. Availability of services and amenities around the residential property that fulfil the basic household needs [107];
2. Availability of full-fledged common spaces for residents of apartment buildings, which ensure socialization of residents and contribute to increasing the ability to build neighbourly cooperation and optimise the use of resources (courtyards, internal common spaces) [108];
3. Versatility of the interior spaces of apartments with the possibility of internal reconstruction to meet the different needs of the family at different periods of its existence (including the possibility of dividing and combining apartments, multifunctionality of utility rooms); the provision of an adequate level of sunlight when dividing rooms, and the possibility of effective shading in the case of excessive sunlight to optimise cooling and heating systems [109].

Based on the conducted research, the following guidelines for programming housing estates were developed:

- Location of the development in relation to the proposed amenities and access to public transport, reducing the need to use private cars, and the proximity of available services and transport stops in the vicinity of the housing development within a radius of 700 m from the main entrance to the housing development site (distance calculated along a safe short walk line);
- Inventory of the housing development site and the need to undertake site adaptation measures; analysis of the feasibility of using existing buildings that will be redeveloped; determination of the percentage of the new development site that was previously developed land;
- Possible remediation of the housing development site, in case of contamination of the development site;
- Solutions for reduction of the heat island effect (the phenomenon of the urban heat island consists in a significant increase in temperature in the city in relation to peripheral areas, which is responsible, e.g., for the accumulation of heat by the urban tissue, including strong heating of the surfaces of walls, roofs, and hardened ground); exemplary solutions: use of surfaces made of light-coloured materials with a solar reflectance SRI of at least 75, or permeable surfaces (min. 50% perforation) with vegetation in the openings. Realisation of flat roofs using a final layer in the form of a light-coloured membrane, covering with light-coloured gravel or other roof finishing material with a solar reflectance SRI of at least 75, or as a green roof. Construction of façades, including the surfaces of loggias and balconies, in light-coloured materials with a solar reflectance (SRI) of at least 0.50, and a thermal emissivity of at least 0.85;
- Using existing vegetation (primarily trees) or designing new planting to provide shade within the project site;
- Shaping the landscape on the basis of natural inventories defining the condition and potential of the local biodiversity, measures to protect the local biodiversity, solutions taking care of the safety of birds, habitat-appropriate plants, drought and flooding-resistant plants;
- Environmental monitoring before and during implementation;
- Introducing drought-tolerant plant species—not requiring intensive watering and care;
- Provision for the development of electromobility, infrastructure for car charging: creating the possibility for the owner of an individual car charging infrastructure/installation of chargers for electric cars in a dedicated parking space;
- Availability of bicycle infrastructure, including bicycle paths at a distance of a maximum 300 m, to which there is safe access along existing pavements, or those designed

and constructed within the framework of the residential development under construction; bicycle storage solutions in the residential development and carsharing (private vehicles made available on the basis of a platform associating users using this service—creation of a platform promoting carsharing for the residents of the residential development or by a business entity offering a rental service for an uninterrupted period);

- When developing the plot, the natural context should be taken into account and a system of biologically active areas should be developed with the addition of tree planting on the plot;
- Implementation of water retention systems within the plot boundaries;
- Providing recreational areas and internal common use spaces on the plot;
- Application of solutions such as green roofs and green walls;
- Analysis of the building life cycle and its potential to function change;
- Use of shading façade elements;
- Energy-efficient solutions, energy-efficient internal transport systems, and air-tightness of the building;
- Reduction of atmospheric emissions and impact on smog formation;
- Indoor air quality control systems, use of natural ventilation;
- Ensuring thermal and acoustic comfort;
- Ensuring daylight access;
- Use of vegetation in the building and biophilic solutions in the design of common space, e.g., exteriors with bamboo planting or shade-loving climbers and, in selected locations in the lobby, walls/elements and illuminated surfaces made of salt, improving conditions and air quality (decontaminating);
- Shaping biodiversity, i.e., species and habitat richness and proportions;
- Shaping an ecospot, i.e., a functioning natural area left without external interference, allowing shelter for small animals, and free vegetation of plants;
- Efficient water management in the project, i.e., re-use of grey water, retention of rainwater and its use, for e.g., garden irrigation and/or toilet flushing and/or infiltration into the ground, use of safe natural methods for water purification (grey water, rainwater), use of technologies reducing water consumption;
- Use of RES, renewable, non-fossil energy sources (wind, solar, aerothermal, geothermal, hydrothermal, biomass, biogas, agricultural biogas and bioliquids);
- Introduction of principles of universal and inclusive design—providing access and use by as many people as possible without the need for additional adaptations or specialised solutions, regardless of age, gender, or degree of disability of the users;
- Use of recycled materials and elements—in line with the principles of a closed loop economy, in order to minimise the use of natural resources and reduce greenhouse gas emissions associated with the manufacture of new building elements; it is advisable to use those which are already in circulation;
- Limiting light pollution, external lighting installation, including the lighting of internal circulation routes within the residential development and lighting elements located on the façade, which should comply with the following conditions:
    - All façade luminaires, including sconces having a flat glass and shielded light source, should be directed downwards;
    - Luminaires with a luminaire emitting light only downwards—the colour of the light should be between 2600 K and 3700 K;
    - Bottom-up illumination of trees and buildings should be abandoned;
    - External lighting installed outside the façade may not exceed the height of 4 m—control of external lighting by an astronomical clock or twilight detectors with the possibility of using night breaks—in the case of external lighting of balconies and loggias, use of lighting with time switches;
- Implementation of green and blue infrastructure solutions on the development site, linked to the urban greening and water management system of the city.

In the discussion, attention should also be drawn to the contemporary humanitarian problem related to the war in Ukraine. In 2022–2023, over a million Ukrainians affected by the effects of the war settled in Poland. The challenge does not only concern Poland, but also Europe and countries outside Europe. Will this have an impact on the shaping of housing development in Poland? This topic is very important. Due to the definition of the research in question, but also the extensiveness of the issue of the humanitarian crisis related to the war, it has not been discussed in this study. This research question remains open as a contribution to further research.

5. Conclusions

The assumption made at the beginning was to collect various aspects present in the process of creating multi-family residential buildings. A clear binder in this was the development context and additional conditions determining a modern approach to design solutions, taking into account factors that are not always obvious from the point of view of both the designer and future users. As the issues presented in the study show, the number of such factors is extremely high, but so are the number of solutions that can be implemented to better reach customers and meet their housing needs. There are trends from the investment point of view to search for a set of solutions, the implementation of which will be the most appropriate for individual social groups for financial, location, or ideological reasons, and then to develop these guidelines within a full-fledged architectural and construction project. The differentiation of these factors, due to location, leading theme, and finally target groups, together with the definition of investment and economic intentions and type of finish standard offered leads to naming the criteria on the basis of which design proposals are differentiated. These criteria, depending on the intentions, can be divided into solid, spatial, material, technological, design, or purely marketing solutions. Depending on the lower or higher investment standard, other characteristic elements are present.

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