// STATUS UND PROGNOSE: SO BAUT DEUTSCHLAND – SO WOHNT DEUTSCHLAND

Der Chancen-Check für den Wohnungsbau

// Bauforschungsbericht Nr. 86

ARGE//eV
Arbeitsgemeinschaft
für zeitgemäßes Bauen e.V.

On behalf of the
Housing Alliance of Associations:

BDB Bundesverband Deutscher Baustoff-Fachhandel e.V.

BFW Bundesverband Freier Immobilien- und Wohnungsunternehmen

DGfM Deutsche Gesellschaft für Mauerwerks- und Wohnungsbau e.V.

DMB Deutscher Mieterbund

Die Wohnungswirtschaft Deutschland GdW

Industriegewerkschaft Bauen-Agrar-Umwelt

ZDB Zentralverband Deutsches Baugewerbe

Study for the 14th Housing Day 2023

and results from current studies

Working Group for Contemporary Building e.V.

Dietmar Walberg - Timo Gniechwitz - Klaus Paare - Thorsten Schulze

Kiel, April 2023

Status and forecast: How Germany builds - how Germany lives. The opportunity check for housing construction

Study on the needs, obstacles, challenges and impending consequences for housing construction in Germany

Client: **Housing Federation Alliance consisting of:**

Federal Association of the German Building Materials Trade - BDB
Federal Association of Independent Real Estate and Housing Companies - BFW
German Society for Masonry and Housing Construction - DGfM
German Tenants' Association - DMB
Federal Association of German Housing and Real Estate Companies - GdW
Industrial Union for Building, Agriculture and the Environment - IG BAU
Central Association of the German Construction Industry - ZDB

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Preface and introduction

"*When normal people can no longer afford rents in the cities,*

then cohesion, which also means democracy, is in danger."[1]

Hans-Jochen Vogel (1926-2020)

Federal Minister for Regional Planning, Building and Urban Development from 1972-1974

The federal government has set itself the goal of building 400,000 flats per year. The estimate of this demand is correct, as the shortfall has already grown to 700,000 flats in Germany[2] . Unfortunately, the target is far removed from the reality of construction. Housing construction in Germany is in crisis. The general conditions have deteriorated significantly overall, even if the effects of the Corona pandemic with regard to the availability of building materials and building products, for example, have been overcome. The current developments in the financial market and the increasing complexity in the planning and execution of construction projects are causing major players in the housing market to strategically withdraw from the realisation of construction projects. The medium- to long-term consequences can become dramatic for the entire construction sector. Just as there are no simple solutions for speeding up the construction of housing projects, there are no single culprits to pinpoint. Whole bundles of measures must be introduced now, and in the very short term, to prevent even worse developments.

More than 60 % of all investments in Germany go into the construction sector, and about 60 % of that into housing construction, both for new construction and for modernisation, maintenance and improvement of the housing value in the existing stock. The corresponding value added of the housing and construction industry is gigantic, and more than 3 million jobs[3] depend on it - significantly more than in any other economic sub-sector.[4] A unique selling point: unlike almost all other comparable countries, housing construction in Germany is dominated by small and medium-sized enterprises, both in construction and planning, and also in the maintenance of housing stock. For decades, the latter has contributed to building housing to quality standards that were oriented towards what was feasible and expected at the time. German housing construction is a quality product.

The created product "housing" and thus: neighbourhood - community - city, creates home, social reference and security and stabilises the German society. Housing must be available in sufficient quantities, in sustainable quality and, first and foremost, affordable for all people. Above all, the quality requirements must not be overstretched; a sensible sense of proportion is required everywhere in terms of the functional expectations of our flats and residential buildings.

The present study is a report that has compiled the current figures on the general conditions on the real estate market and for housing construction, on housing needs, in an exemplary manner, in order to provide decision-makers with a basis for strategic goal setting. Express thanks are due to the colleagues from friendly institutes, research institutions and associations who contributed to this study with their findings, results and analyses: Matthias Günther from

[1] Hans-Jochen Vogel on Deutschlandfunk Kultur on 01.04.2019
[2] [Pestel/ARGE 2023]
[3] Cf. [Baukultur 2023]
[4] See also: Hauptverband der Deutschen Bauindustrie e.V. (ed.): "Bauwirtschaft im Zahlenbild", Berlin, April 2022

the Pestel Institute for Systems Research in Hanover[5] , Dr. Reiner Braun from empirica ag, Christian Engelke from the Bundesverband Baustoffe - Steine und Erden e.V., Dr. Andreas Geyer from the Zentralverband Deutsches Baugewerbe, Dr. Rainer Pohl, LCEE Darmstadt, Florian Dilg - architect and urban planner for the Bundesarchitektenkammer and Michael Neeve and colleagues from IB.SH - Investitionsbank Schleswig-Holstein.

One thing can be stated in any case: Quick decisions are needed, the framework conditions for building housing must be drastically improved at all levels, otherwise it may well happen that the performance of the construction sector collapses like a "house of cards".

Prof. Dipl.-Ing. Dietmar Walberg

Kiel in April 2023

ARGE//eV

Founded on 21 February 1946, the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. (ARGE//eV) is Germany's longest-serving publicly commissioned construction research institution and works as a housing institute on behalf of the state of Schleswig-Holstein to support and qualify social housing promotion. In addition, ARGE//eV is a network for the building industry and a provider of further education and training with its own specialist publishing house. The main focus of construction research is the permanent observation of the German market situation in housing construction with regard to the development of construction and building costs as well as constructional and qualitative standards and their adequacy. Furthermore, the non-profit purposes of the statutes, such as testing and researching new types of construction and building methods and creating the basis for affordable housing, are among the core tasks of ARGE//eV.

ARGE//eV is a rationalisation institute for housing construction on the basis of the rationalisation decree of the state of Schleswig-Holstein "Promotion of social housing construction in Schleswig-Holstein; here, possibilities of promotion of construction projects, reduction of construction costs, building industry reviews, rationalisation of construction activities and involvement of a rationalisation institute" of 11 January 1972. This is also the basis for the activities for other, primarily public clients, such as the Federal Government or the Senate of the Free and Hanseatic City of Hamburg, as well as cross-interest networks such as alliances of associations within the framework of the "Impulse für den Wohnungsbau" (Impulses for Housing), etc.

ARGE//eV is a consensus institution that works independently of interests and whose approx. 460 largely institutional members as architects and engineers, lawyers, the housing companies of Schleswig-Holstein, Hamburg and Mecklenburg-Vorpommern, municipalities and districts, the building industry and the associations of the building and housing industry throughout Germany, the building industry, building materials industry, building materials trade, the universities, the consumer advice centre, the Investitionsbank Schleswig-Holstein, are to represent the entire spectrum of the building industry.

In accordance with its statutes, ARGE//eV exclusively and directly pursues charitable purposes within the meaning of the German Fiscal Code (Abgabenordnung). ARGE//eV operates selflessly; it does not primarily pursue economic purposes.

[5] [Pestel 2023]

1. initial situation and developments

1.1 Housing demand and population development

Compared to other goods, the immobility and longevity are the outstanding differentiation criteria of dwellings. Another criterion is the cost of a flat, which is usually several times the annual salary of the respective occupant.

Due to the immobility of the dwelling, there is no option to balance the market through imports and exports. On the other hand, due to the longevity, the quantitative change through new buildings and demolitions is limited to a fraction of the stock. The highest relative new construction activity of the past 40 years was achieved in 1995 with new construction amounting to 1.68 % of the stock. This of course also limits the qualitative improvements to the stock through new construction. In 2021, new construction activity reached only 0.7 % of the stock.

Overall, the quantitative supply reacts sluggishly to changes in demand. This is also due to the considerable planning and realisation times in residential construction, which are now three to five years for multi-storey residential buildings (see also the comments on the development of gross construction time in residential construction in Chapter 3.1). For example, the highest construction activity of the 1990s in western Germany occurred only about five years after the strongest immigration. In the case of rapid, potential growth in demand, for example due to immigration, the balance between supply and demand is achieved directly via the price. Further adjustment reactions of the population lie in children staying longer in their parents' homes and in the increased formation of shared flats. The early 1990s in West Germany or the period from 2014 onwards can be taken as examples of this. While price increases occur primarily when tenants change, decreases in rents are limited to the top price range. In contrast, for properties for sale, in individual cases even a price of zero euros does not lead to a sale, i.e. the value of residential property can become negative.

The low reaction speed of the supply tends to lead to market imbalances again and again. This applies to general changes as well as to regional or local discrepancies due to the locational stability of housing.

The differentiated variety of offers is reduced more and more for the flat seeker. The more concrete the ideas of the flat sought (size, furnishings, location, price, ...), the smaller the offer. In this respect, almost every housing turnover, i.e. every conclusion of a purchase or rental contract, is a compromise between wishes and possibilities from the point of view of the person looking for a flat.

From a social point of view, it is of high importance that the dwelling is the centre for the private household and the centre of life for the family. It is therefore self-evident that the state has a special interest in providing all citizens with adequate housing. This idea of provision is the starting point for defining a housing need, because not all private households are able to provide themselves with adequate housing on the market.

In 2021, a total of around 13 million people in Germany, or just under 16 percent of the population, were considered to be "at risk of poverty". All people whose net equivalent income is less than 60 percent of the median income are considered "at risk of poverty". In 2021, the

at-risk-of-poverty threshold for single households was 1,251 euros per month. A good three million households alone receive citizen's allowance or basic income support and are threatened by the fact that their rent could no longer be "adequate" if there is a rent increase and will only be partially covered "by the authorities". In many regions, however, moving is hardly possible for all low-income households because a flat with affordable or adequate rent cannot be found.

The realisation, also anchored in many housing promotion laws of the Länder, that some households are not able to provide themselves with adequate housing on the market, illustrates the dual character of housing as a market and a social good. In a social market economy, this fact requires the political definition of supply targets by the state. If the comparison of supply targets with the actual state of supply reveals an undersupply, housing policy action is indicated.

The simplest definition of a supply target is the availability of housing for every private household. If this is not given, there is a lack of housing, the creation of which should then be a political goal as quickly as possible. The goal of building 400,000 dwellings per year, of which 100,000 are to be subsidised as social housing, as stipulated in the current coalition agreement, is a goal derived from the housing supply situation and the expected demographic development.

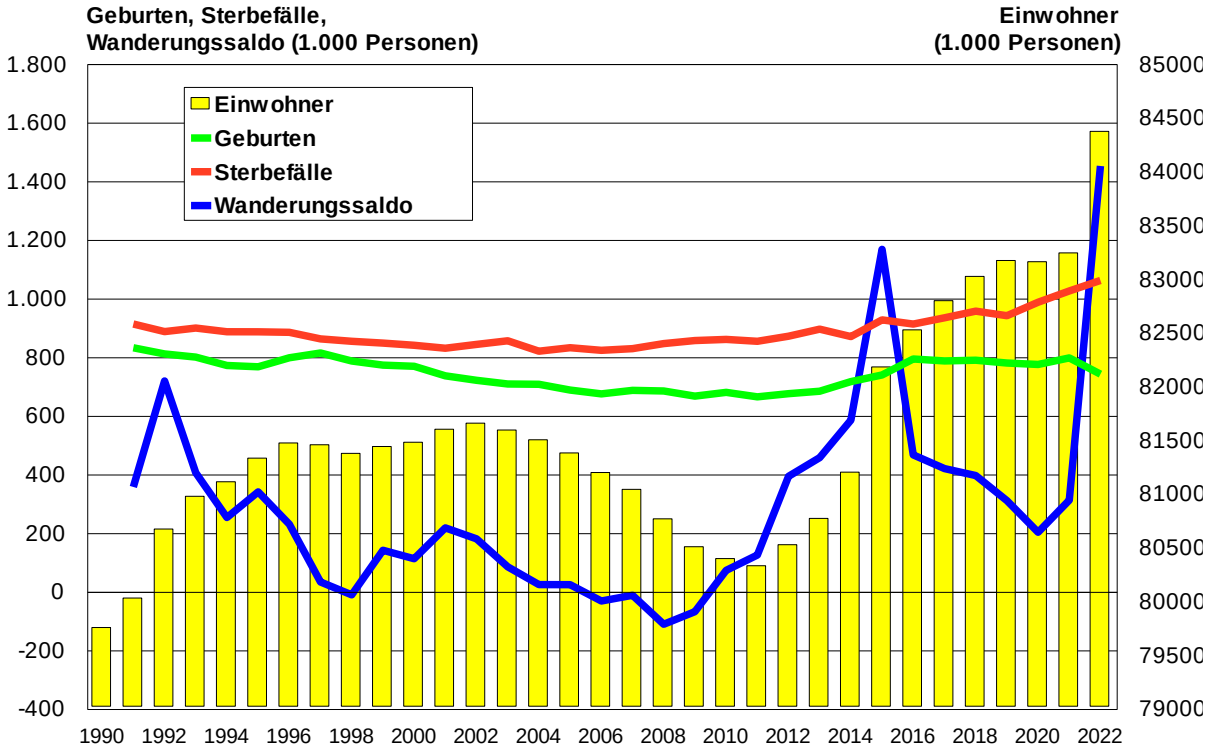


Figure 1: Depiction of population development in Germany from 1990 to 2022; births, deaths, net migration and inhabitants (1,000 persons)
Source: [Pestel 2023]

The demographic development since the beginning of the 1990s is shown in Figure 1. In addition to the difference between deaths and births rising again, the immigration surges at the beginning of the 1990s, in 2015 and in 2022 can be seen. The immigration surge in the 1990s related exclusively to western Germany and was intensified by strong east-west internal migration. In addition, the baby boomers of the 1960s were in the household formation phase at the time, so that in addition to the housing demand for immigrants, there was also a high housing demand from the native population.

After a phase of low immigration from 1996 to 2011, the positive economic development in Germany led to a significant increase in migration gains from 2012 onwards. Initially, it was mainly immigration from Eastern European EU countries into the local labour markets, but from 2014 onwards refugee immigration was added, culminating in the immigration peak in 2015. In the following years, immigration remained at a high level with the exception of 2020, the beginning of the Corona pandemic. On average, the migration gain from 2012 to 2022 was a good 550,000 persons per year. In contrast, the migration gain in the years 2000 to 2011 was only 114,000 persons per year.

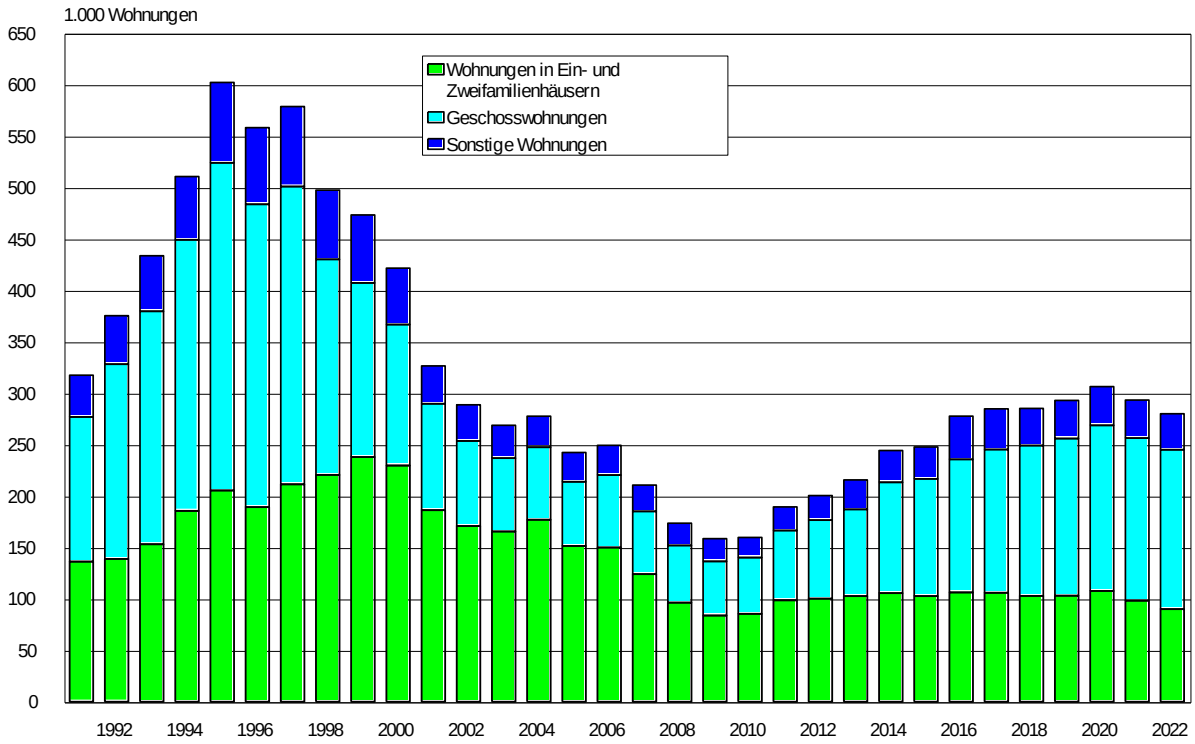


Figure 2: Representation of housing completions in residential construction in Germany from 1991 to 2022; differentiated by building type (1,000 dwellings)
Source: [Pestel 2023]

Figure 2 shows the residential construction since the beginning of the 1990s. The delayed reaction of residential construction to the immigration around 1990 and a pronounced peak in residential construction in the years 1995 to 1997 can be clearly seen. Afterwards, residential construction declined steadily and in 2009 and 2010 only a good quarter of the peak value from 1995 was reached. Although housing construction roughly doubled from the low point by 2020, the completion figures of the 1990s were by no means reached again. There is no sign of a reaction to increased immigration.

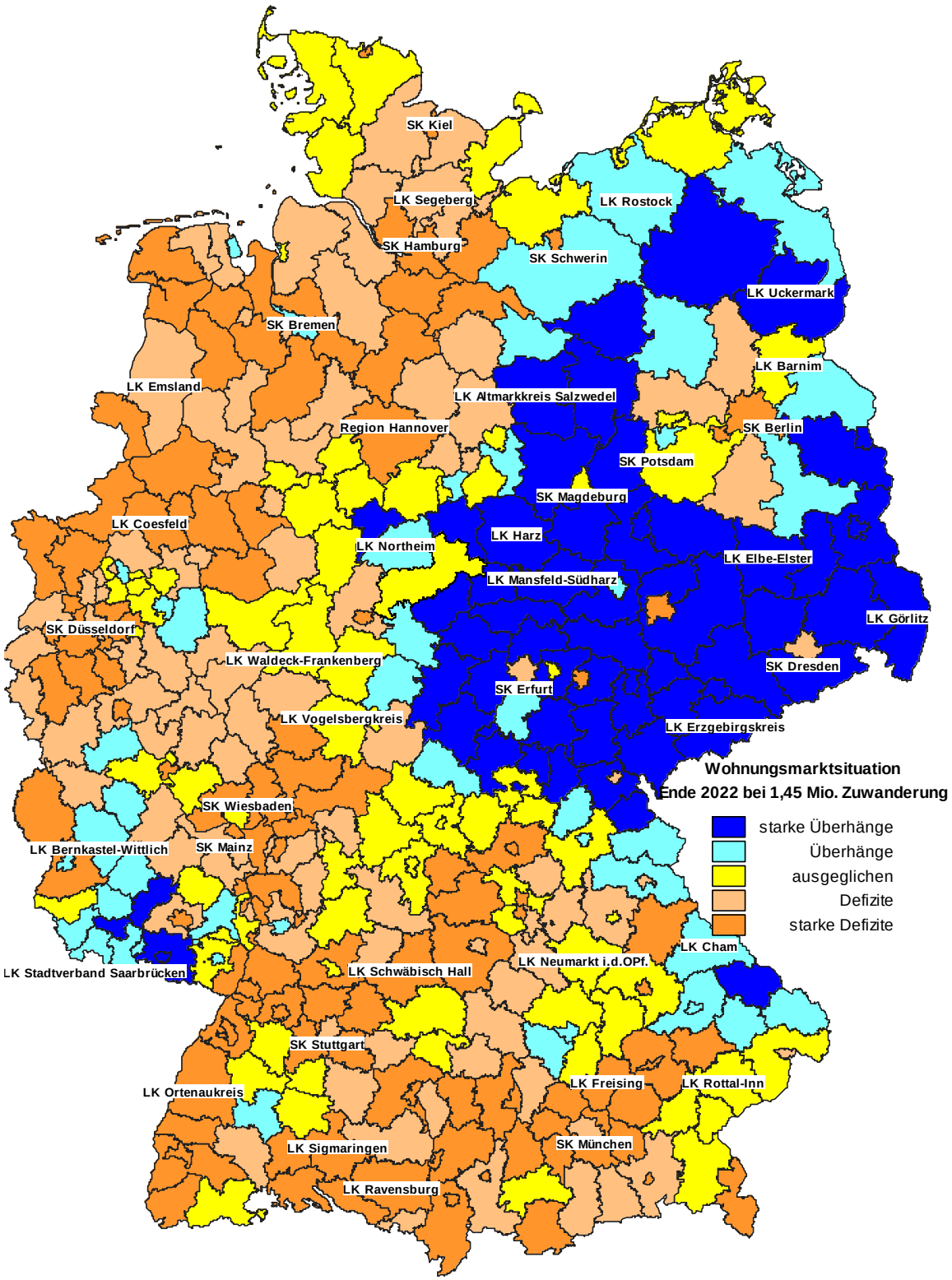


Figure 3: Illustration of the housing market situation at the end of 2022 in the districts and independent cities of Germany; colour-coded from strong deficits (orange) to strong surpluses (blue).
Source: [Pestel 2023]

Housing the immigrants in flats was not possible, especially in 2015. Accommodation was provided in rented or purchased hotels, in empty industrial and logistics halls, in newly created container camps and even in sports halls. The political statement was that refugees should

live in flats after one year at the latest. The clear formulation of a housing need. Although the actual development led to a certain easing on the housing markets, especially in the Corona years 2020 and 2021, there was still a shortage of more than 400,000 flats at the end of 2021, especially in the West German conurbations. In eastern Germany, Berlin and a few large cities were affected by the housing shortage. At the same time, vacancies had grown in economically less dynamic regions, so that the regional housing surpluses added up to over 550,000 flats.

In 2022, the migration gain of significantly more than 1.4 million people and a slight decline in housing construction led to a sharp increase in housing deficits and a melting of the housing surpluses. A regionalised overview is shown in Figure 3. For housing construction in 2022, the average of the years 2019 to 2021 was used at the regional level. Population development was estimated on the basis of data as of 30.9.2022. Overall, the housing deficits amounted to just under 700,000 dwellings and the housing surpluses have decreased to just over 400,000 dwellings. However, some of the housing surpluses do not seem to be available to supply the population. For example, even eastern German districts, some of which had vacancy rates of well over 8 per cent in the 2011 census, had to resort to building container quarters or buying hotels to accommodate refugees. Here, the statistics are likely to include flats that cannot be occupied without basic refurbishment.

1.2 Population, household development and housing demand until

The actual situation is thus characterised by the fact that the immigration surge in 2022 caused housing deficits to rise to around 700,000 dwellings and that the political target of building 400,000 dwellings annually (of which 100,000 are social housing) was missed.

2045

In order to secure Germany as a business location, immigration will continue to be necessary at a high level - irrespective of the refugee situation - as the baby boomers of the 1960s will reach retirement age in the next 15 years. Without gains in migration, the number of people of working age in Germany would fall by about 6 million by 2035. Since the labour force participation rates above the age of 50 have already increased considerably for men and especially for women in the last 20 years, a cushioning of the loss of people of working age through a further increase in the labour force participation rates is only possible to a limited extent. Figure 4 shows a model calculation of population development until 2045.

With a migration gain of 330,000 persons per year, the number of inhabitants remains well above 83 million. The average variants of the current population projections of the Federal Statistical Office show similar values. The population ultimately forms the private households that act as demanders and consumers on the housing market. The steady reduction in household size observed over decades will continue in an ageing society, even if not at the same pace as before. As Figure 5 shows, the number of private households will still increase by a good 2 million by 2045.

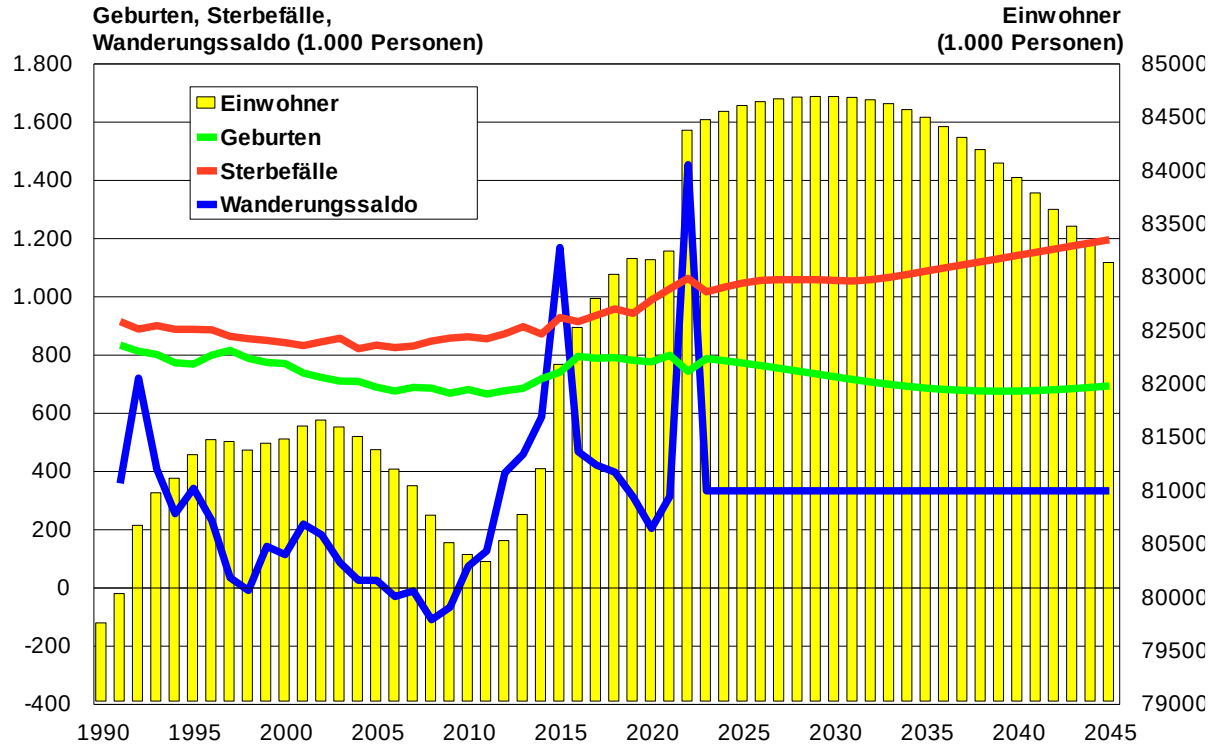


Figure 4: Representation of population development in Germany from 1990 to 2022 and in model calculation to 2045; births, deaths, net migration and inhabitants (1,000 persons)
Source: [Pestel 2023]

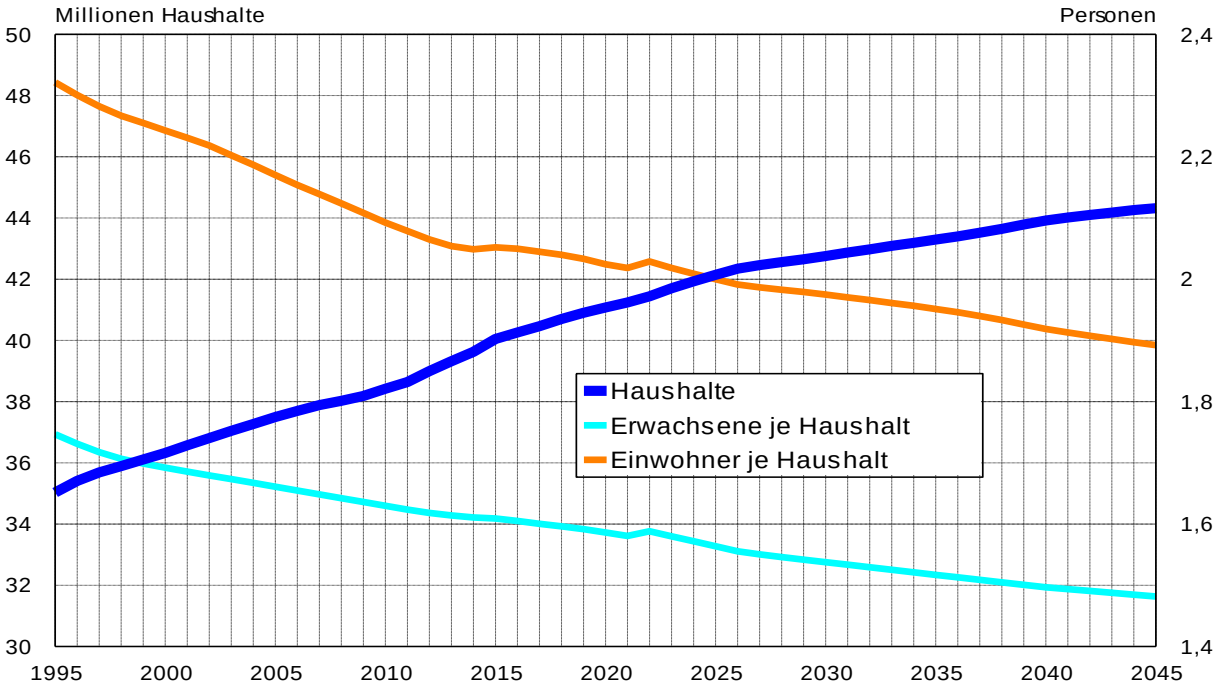


Figure 5: Presentation of household development in Germany from 1995 to 2022 and in the model calculation until 2045; households (million households), adults per household and inhabitants per household (persons)
Source: [Pestel 2023]

A look at the age structure and its change (Figure 6) gives an initial indication of the structure of the future demand for new buildings. [6]

[6] See explanations under [Pestel 2023a].

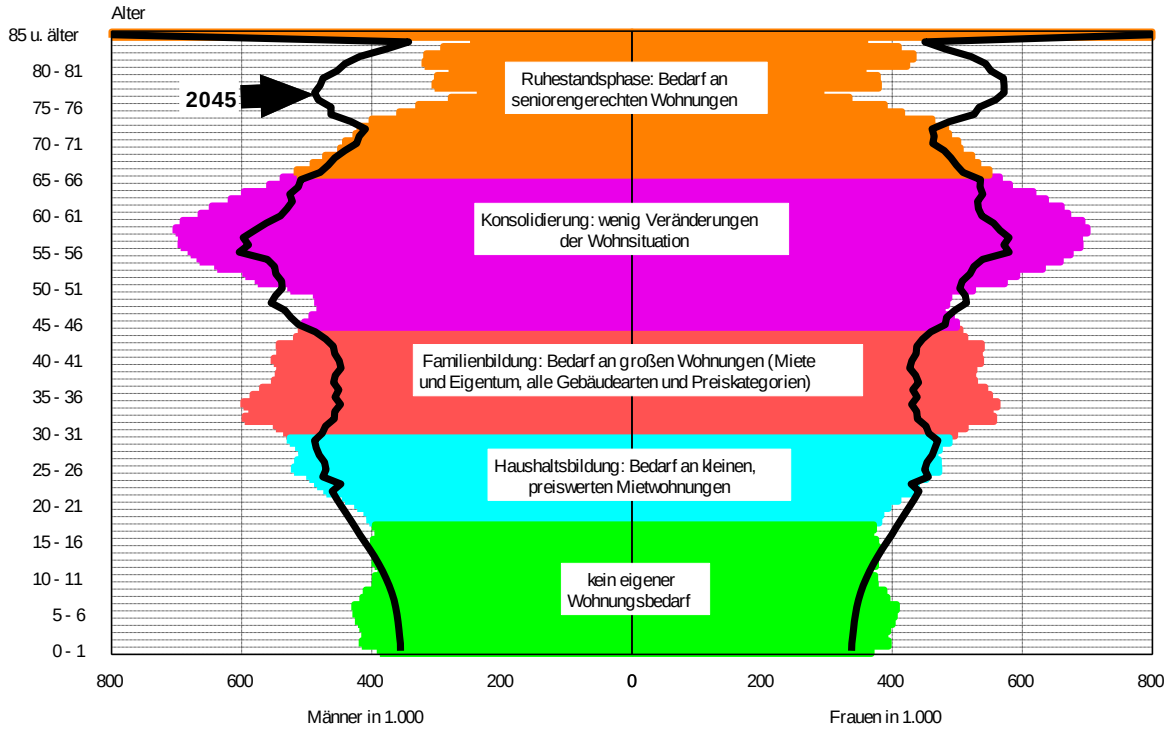


Figure 6: Representation of housing demand in Germany according to the age of the population; age structure of the population in 2022 and in the model calculation in 2045 (women/men in 1,000)
Source: [Pestel 2023], [Pestel 2023a].

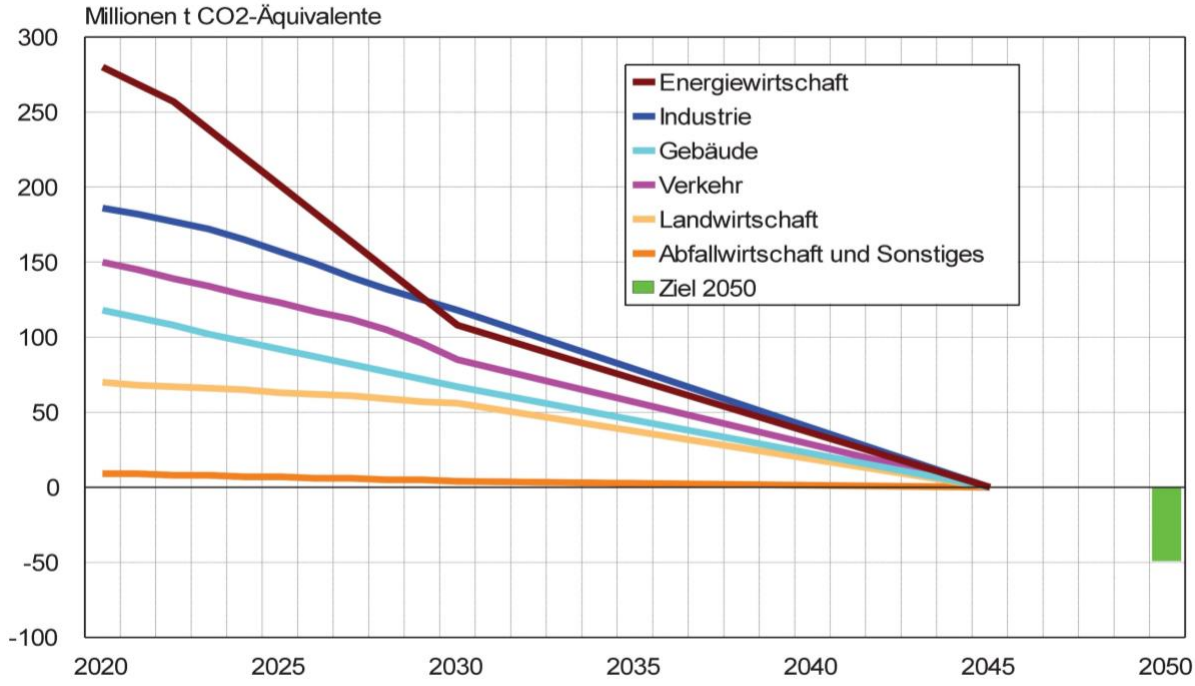


Figure 7: Presentation of the targets for the reduction of greenhouse gas emissions in Germany by 2050; differentiated in the respective sectors (million t CO_2 equivalents) according to the Federal Climate Protection Act
Source: [Pestel 2023]

In addition to the demographic demand for housing resulting from the increase in private households, there is also a need for replacement housing to replace housing that is technically/economically unfit for renovation. At present, hardly any housing is being demolished in Germany. The housing demolition in 2021 (in residential buildings) of 14,817

dwellings corresponded to a demolition rate of 0.036 % (declining for years) or a theoretical lifespan of a good 2,800 years for a good 42 million dwellings in the residential building stock. This does not allow for a continuous renewal of the housing stock.
In Germany, about 10 percent of the housing stock is considered technically/economically unrefurbishable.[7] Some of these dwellings are located in areas with housing surpluses and do not need to be replaced, but the dwellings located in the deficit area should be replaced by 2045. It should be noted that every increase in the requirements for existing dwellings (energy efficiency, fire protection, noise protection, accessibility, ...) increases the share of technically/economically non-refurbishable dwellings.

As the distribution of the housing stock among the different building age classes in Figure 8 shows, about 75 per cent of the currently available dwellings were built before 1990. When these flats were built, the focus was neither on energy efficiency nor on accessibility. In addition, many of these flats have floor plans and room layouts that are no longer contemporary.

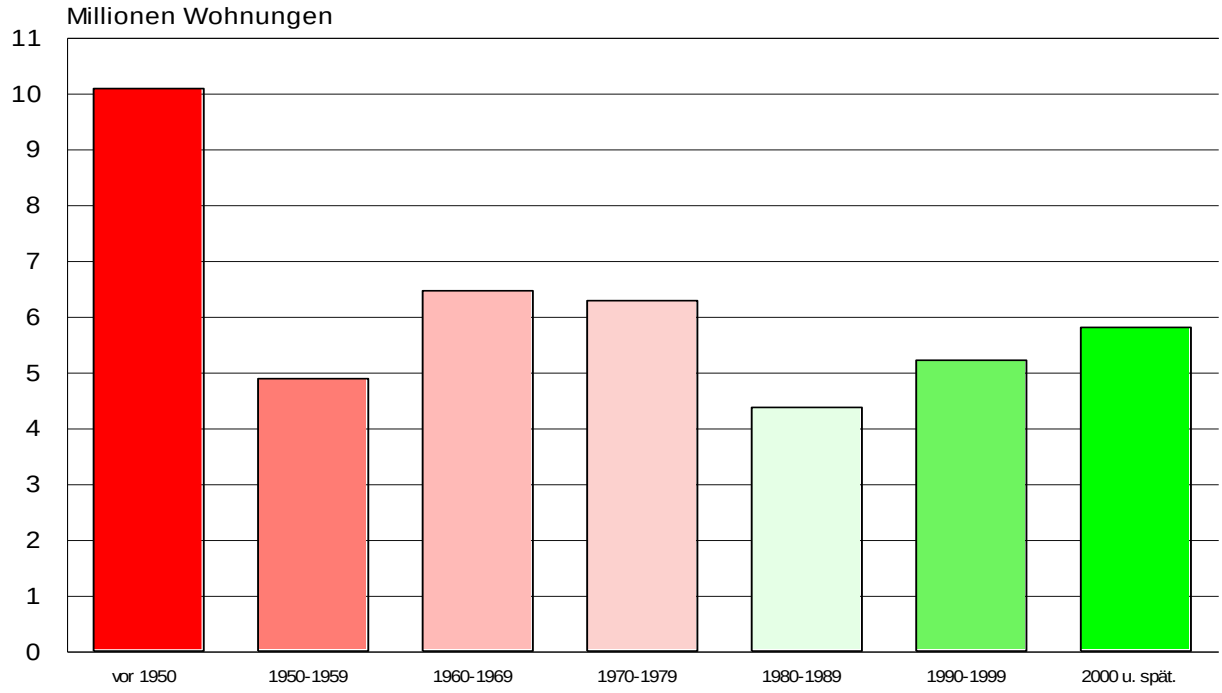


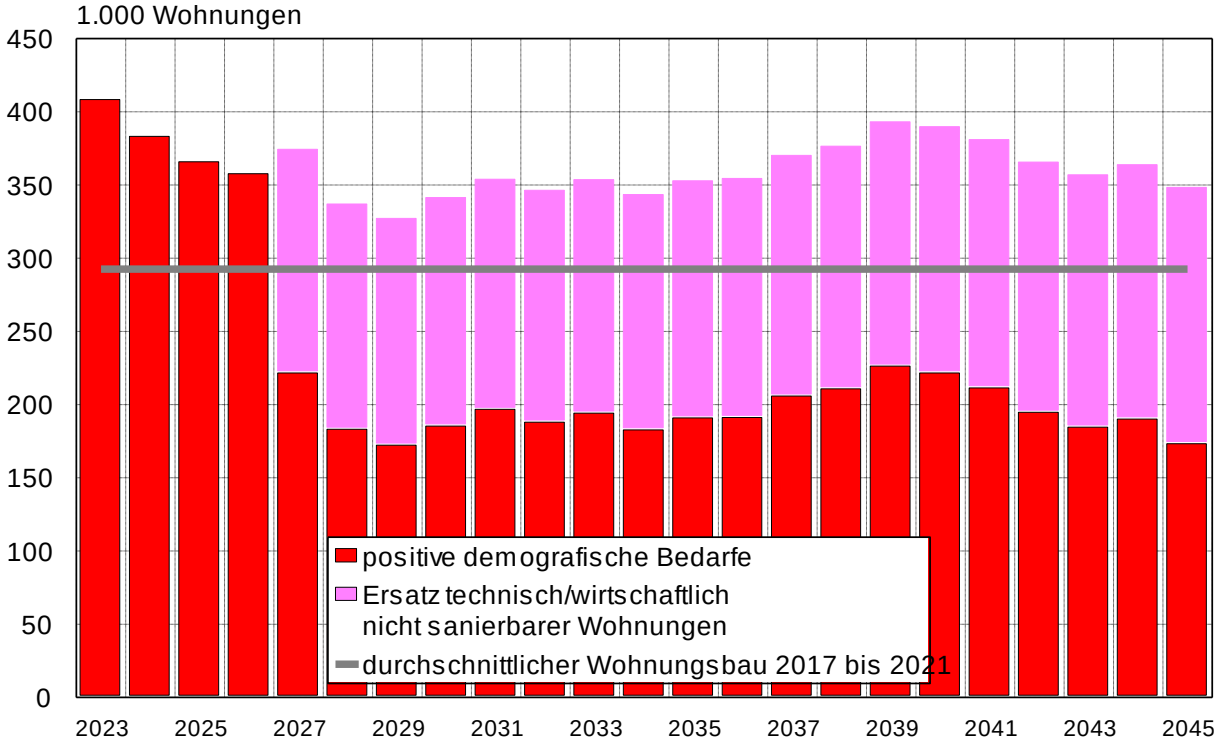
Figure 8: Representation of the housing stock in Germany by building age class in 2022 (million dwellings)
Source: [Pestel 2023]

Figure 9 shows the housing demand from 2023 to 2045. In the coming years, the additional housing deficits accumulated up to and in 2022 must be eliminated as quickly as possible[8] . Furthermore, the state must then also turn its attention to the increased replacement of housing that cannot be refurbished. All in all, the federal government's housing construction target is reasonable, both in terms of the total number and with regard to social orientation. What is

[7] [ARGE 2011], [ARGE 2016], [ARGE 2016a], [ARGE 2022a].
[8] From 2022 onwards, especially due to strong immigration from Ukraine, see [Pestel/ARGE 2023].

currently lacking is a goal-oriented initiative at all levels regarding the implementation of this housing target and the measures required to achieve it.

Figure 9: Illustration of housing demand in Germany from 2023 to 2045 (1,000 dwellings); differentiated into positive



demographic demand and demand due to the replacement of technically/economically unrefurbishable dwellings [9]
Source: [Pestel 2023]

Housing demand (new construction)	Period 2023 to 2025
Upper variant	334,000 flats p.a.
Medium variant	**320,000 flats p.a.**
lower variant	306,000 flats p.a.

Figure 10: Tabular presentation of the annual housing demand (new construction) in the period 2023 to 2025 (without pent-up demand - therefore rather lower limit); differentiation of results in the form of a lower, a middle and an upper (development) variant
Source: [empirica 2023b], own representation

On the basis of its housing market forecast[10] empirica ag arrives at an annual demand for new housing construction for the period 2023 to 2025 of 306,000 (lower variant) to approx. 334,000 (upper variant). In the middle variant, the demand for new housing is estimated at approx. 320,000 dwelling units per year to meet the demand. The scenarios reflect the migration forecast, in particular the flight movements resulting from the war in Ukraine. This demand forecast differs from the demand forecast made above, in particular, in that it was made without the backlog of housing that has not been created in recent years. It is therefore described more as a "lower bound". The demand forecast therefore also covers the estimate of approximately 400,000 housing units per year to be created in order to adequately meet the demand for housing in Germany.

1.3 Current housing construction activity

[9] Cf. [ARGE 2022a]; adjusted assessment for stock adjustment, 01/2023
[10] [empirica 2023b]

According to the forecasts of the associations (see Figure 11)[11] it is expected that the number of housing completions of currently 293,393 housing units[12] will decrease significantly in the next few years. This means that the target for meeting the demand for housing in Germany of 400,000 housing units per year will be emphatically missed.

Some drastic declines in new residential construction are expected for 2023. Providers of single-family homes expect a slump of 30 to 50 percent. Significant declines are also expected in the construction of multi-family houses, as the new framework conditions with increased interest rates and construction costs will result in rental and purchase prices that are hardly feasible on the market.[13]

Although the construction backlog should have reached a new record level by the end of 2022 and at least the buildings already ready for rough construction should still be completed, since the new (greatly changed) framework conditions mean that projects that have not yet been started are usually put to the test, a particularly sharp slump in housing completions is expected for 2023/2024 at the latest.

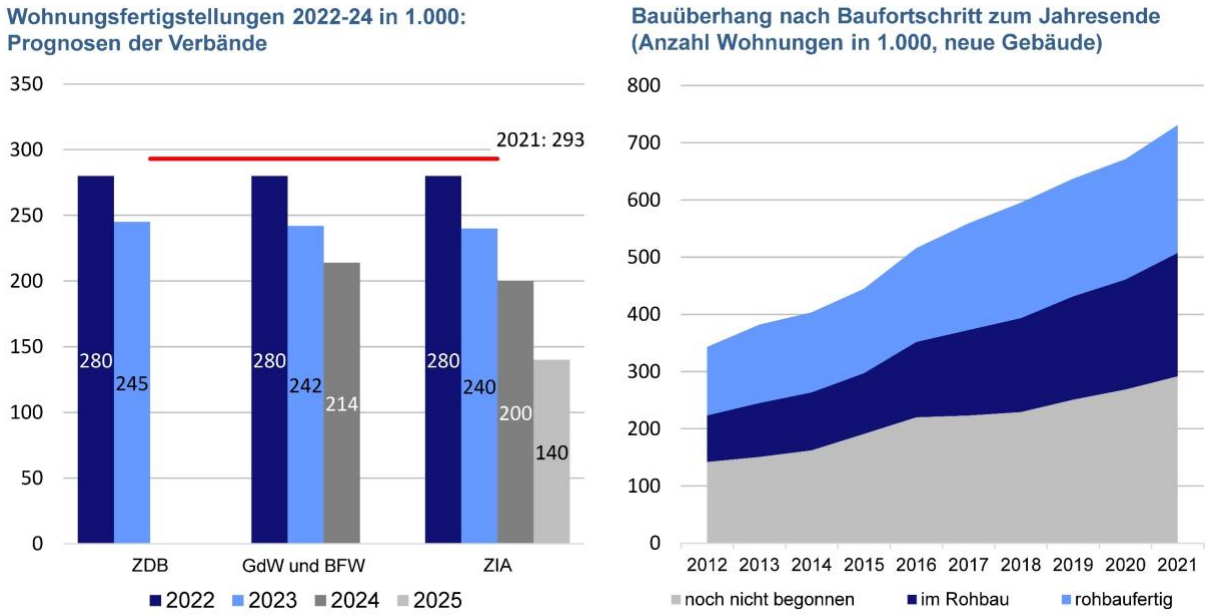


Figure 11: Presentation of housing completions and construction backlog by construction progress at the end of the year in Germany; developments and forecasts (dwellings in 1,000)
Source: Federal Statistical Office, ZDB, GdW, BFW, ZIA, BBS, own presentation

In view of the longer-term housing need, such a drastic slump in construction must be prevented at all costs. Otherwise there is a danger of a permanent housing shortage in Germany - with all its far-reaching consequences.

Note: For decades, the figures for construction backlogs have been a reliable basis for forecasting housing completions in the following years. However, the building backlog with a continuously rising number of flats, especially in buildings that have not yet been started (with a strong upward trend), is no longer suitable for making realistic implementation forecasts on this basis due to the current, in some cases long-term, postponement of projects or even the

[11] Cf. [DB Research 2023] according to the Germany Monitor (as of 05.04.23) in 2022: 279,600 flats and in 2023: 246,000 flats
[12] Federal Statistical Office; press release no. 212 of 23 May 2022, Housing completions for 2021
[13] [Pestel/ARGE 2023]

complete abandonment of realisations (wave of cancellations[14]). Rather, for a large number of the flats listed in the construction backlog, it is therefore questionable when and whether they will ever be built. For this reason, the number of construction backlogs can currently be used as an indication of a certain state of affairs, but not as an indicator for reliable estimates of future developments in housing completions.

Productivity index in main construction / primary construction of housing from 2002 to 2021

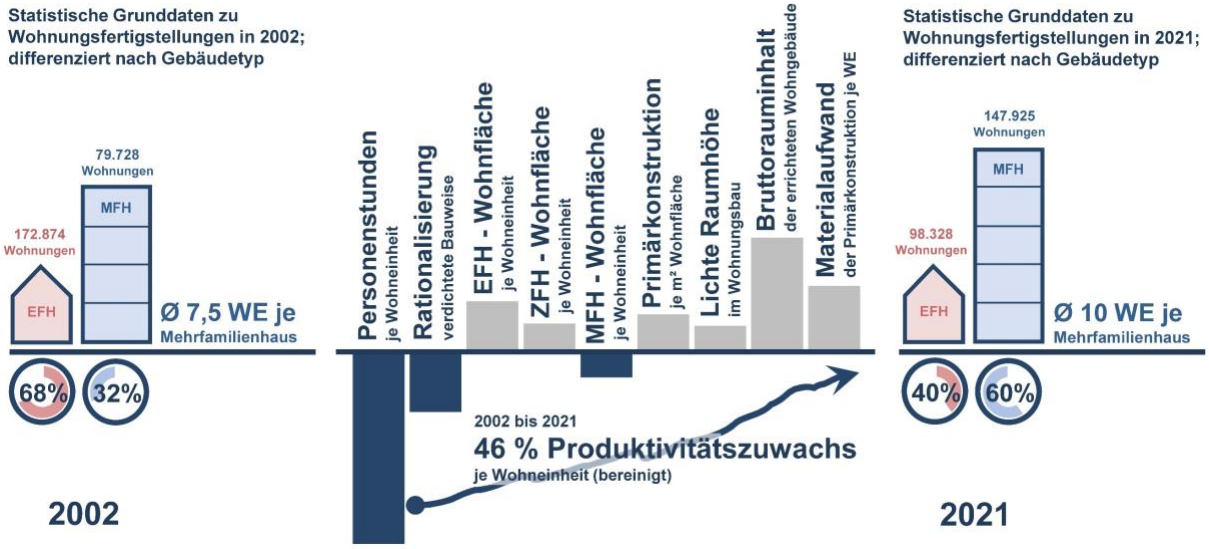


Figure 12: Productivity growth in residential construction (main construction sector) showing corresponding framework data, aspects and developments in the period 2002 to 2021
Source: Federal Statistical Office, DIW; ZDB, own calculation

In view of the decline in housing construction activity and thus the failure to reach the target of building 400,000 housing units per year, the narrative of a presumed inadequate productivity in the building trade and construction industry sector persists. If we look at the realistic productivity and rationalisation in the construction industry (especially in the main construction trades) and the actual quality of the primary structures in German housing construction, this assumption is untenable.

Assuming a halving of the personnel hours used in the main construction trades (bricklaying/reinforced concrete work/carpentry work) per completed housing unit from 2002 to 2021[15] , this results in an unadjusted productivity increase in the main construction trades of approx. 100 % per dwelling unit.[16]

For an adjusted view of this productivity development, the changes in the market, construction methods and designs must be taken into account:

In 2002, the share of single-family houses was 68 %, that of multi-family houses 32 % - in 2021, the ratio has almost reversed: from a share of only 40 % single-family houses to 60 % multi-family houses in the construction of residential buildings. (The average multi-family house

[14] "Cancellation wave in residential construction on the rise"; Ifo Institute- Economic Survey 02/2023, press release
[15] Sources: DIW, ZDB, DESTATIS, project evaluations of ARGE//eV and own calculations
[16] Current working time measurements, own survey

in new construction in 2002 had 7.5 dwelling units, the completed multi-family house in 2021 had ten dwelling units on average). [17]
This change results in an adjusted rationalisation advantage for the higher-density construction method of approx. 15.5 %.[18]

Furthermore, the following other changes have occurred:

The average living space per dwelling unit increased by 13.4 % in the single-family house, by 7.6 % in the two-family house and decreased by 6.5 % in the (now dominant) apartment building.[19]

According to detailed floor plan analyses, this means an increase of approx. 10 % primary construction per square metre of living space for the smaller residential units.[20]

From 2002-2021, the average clear room height in residential construction increased by approx. 7 %.[21] The gross volume of the constructed residential buildings increased by approx. 30 % per residential building in the same period.[22]

Overall, the material costs of the primary construction per dwelling unit thus increased by approx. 17.5 % due to the floor plan changes, changes in the net and gross room content, changed sound insulation standards, other room and floor heights, etc.[23]

Taking the aforementioned framework conditions into account, the adjusted productivity growth for the main construction industry amounts to approx. 46 % within the last 19 years.

(This is the highest growth in post-war history. For comparison, productivity growth from 1965-1993, for example, was about 38% and was considered incredibly high).[24]

The overall weaker productivity development across all services in residential buildings is structurally attributable to the finishing trades, since increasingly complex designs have to be realised there, especially in the area of building services (see also cost increases for these trades in Figures 14 and 15).

Serial and modular systems for cost reduction are therefore more effective in the building services areas than can be expected in the area of primary construction (shell construction). In addition, the interface problems of these trades (heating, ventilation, sanitation, electrical + e.g. then following: tiling work etc.) are significantly more extensive (defects, construction site procedure etc.) than in the shell construction trades and at the same time there is a lower life expectancy (replacement) of the technology compared to a large part of the building construction.

[17] [DESTATIS 2022]
[18] Cf. [BMSW 1972], [BMBRBS 1977], [ARGE 1993] and reports of the Rationalisierungsinstitut ARGE//eV to the state government of Schleswig-Holstein 1972-2002.
[19] [DESTATIS 2022]
[20] [ARGE 1972 ff]: Floor plan analyses, project archive ARGE//eV
[21] [ARGE 1972 ff]: Project analyses, project archive ARGE//eV
[22] [DESTATIS 2022]
[23] Analyses of completed construction projects, ongoing support and monitoring of housing construction; ARGE//eV
[24] [ARGE 1993]

2 Current framework conditions

2.1 Development of construction costs in residential construction

- **The median cost of construction including land costs (investment costs) for housing in major German cities is currently around €5,148.**
- **A freely financed rental hardly allows a monthly cold rent per square metre of living space of less than about € 17.50 at the current cost and interest rate level.**
- **Particular cost drivers are currently the technical requirements, building land prices and regular additional, specific location requirements for inner-city construction projects, as well as the very dynamic price development in recent quarters (fluctuating strongly at a very high level in some cases) for certain building products.**
- **Further, qualitative requirements for the construction of residential buildings make the realisation of affordable housing hardly possible.**

Cost development: construction prices, construction (work) costs and cost status in German residential construction

In several comprehensive studies and implementation considerations on construction and cost-optimised rental housing construction and on the current cost drivers for housing construction[25] in Germany, the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. (Association for Contemporary Construction) has dealt in detail with the systematic data and construction cost analysis of completed new building projects . [26]

In this context, the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. (Association for Contemporary Construction) collects and evaluates corresponding evaluation data in an ongoing process. This procedure of continuous data collection and analysis enables, for example, the regular publication of specialist information on the latest cost developments in German housing construction.

In addition, the focus of the construction research of the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. on behalf of the public sector, also as a housing institute on behalf of the state of Schleswig-Holstein for social housing promotion, is the permanent observation of the market situation in housing construction[27] with regard to the development of construction and building costs as well as the constructional and qualitative standards and their appropriateness. [28]
In this brief study, the results and findings of these investigations refer to optimised residential construction in the medium price segment with good living comfort (new multi-storey residential construction) in Germany. In order to be able to determine and present construction costs in a comparable way, it is important to have a uniform basis of observation. For this purpose, the

[25] [ARGE 2015]
[26] e.g. [ARGE 2017], [ARGE 2019b], [ARGE 2021], [ARGE 2022c].
[27] see also [ARGE 2019a]
[28] Note: Since the foundation of the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. in 1946, annual evaluations and reports on regional and supra-regional construction activity as well as the collection of specific and construction industry data have taken place. At the same time, for example, price/cost databases are kept that are based on the analysis of invoiced construction measures. These are recorded in a regional, but also supra-regional archive with comparison of national data. The monitoring of pilot and demonstration building projects in the Federal Republic of Germany since 1950 with a focus on the 1950s, 1960s, 1970s and early 1980s, the monitoring and evaluation of projects planned with a focus on energy and resource conservation from the 1990s onwards, as well as the inventory of building typifications carried out in-house are also continuously evaluated.

Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. (Working Group for Contemporary Building) has defined a model building typical for multi-family houses in multi-storey residential construction in a basic study .[29]

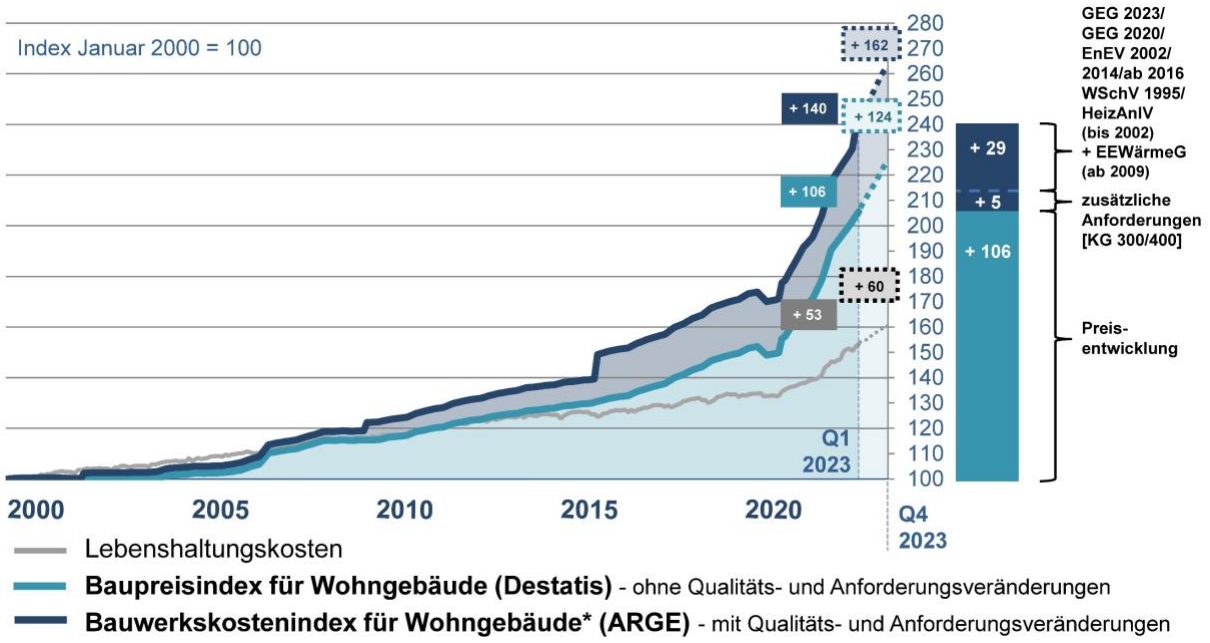


Figure 13: Development of building costs in new residential construction (Destatis price index/ARGE cost index, reference: type building)[MFH30] taking into account VAT in comparison to the general cost of living; period: 1st quarter 2000 to 1st quarter 2023 as well as forecast for the 4th quarter 2023
Source: Federal Statistical Office, controlling and data archive ARGE eV as well as surveys on behalf of the public sector in cooperation with the housing industry.

On the basis of the above diagram, a much more pronounced price and cost development in the construction costs of new residential buildings can be seen, especially for the period under review of the last ten to twelve years (particularly evident since 2021).

Also striking in this context is the higher level of the building cost index and the associated increase in the difference to the construction price index, particularly in the past decade, including striking jumps in the development of building costs. At the cost level of the 1st quarter 2023, the cost index is at 240 index points compared to the reference point of the 1st quarter 2000 and is thus 34 points higher than the construction price index. The difference compared to the cost of living index, however, is significantly higher at 87 points. The existing gap between the cost-of-living index and the construction price index is also worth noting here. Since 2010/2011, construction prices have developed at a higher rate than general inflation - since 2015 with an increasingly stronger (accelerated) development.

However, there can be no talk of an "explosion" in construction prices, since they have developed for many years in line with the rate of inflation or price increases, and now the results of, among other things, extraordinary price increases for certain materials are also becoming noticeable. More dramatic and profound, on the other hand, is the development of building costs. They characterise the costs that arise at the respective time when a square metre of living space is created in a multi-family house according to the legal, normative and other minimum standards that apply in Germany.

[29] [ARGE 2014]
[30] Type building, see [ARGE 2014]

The existing "kink" in the index development from the 2nd quarter of 2020 to the 3rd quarter of 2020 represents a special situation. For this period, against the backdrop of the Corona pandemic and its economic consequences, among others, in conjunction with the VAT reduction limited to the period from July 2020 to December 2020, an increased dynamic with a tendency towards negative developments in construction prices and costs was identified.

On the other hand, construction prices and construction costs have been on a strong upward trend since Q1 2021, partly due to unstable global supply chains and the associated shortage of materials for certain construction products, which was further accelerated in intensity by the Russian invasion of Ukraine on 24 February 2022 and the associated difficulties and restrictions for the construction industry.

In addition, the already very difficult situation was further exacerbated in terms of construction costs (technical expansion) by the amendment of the Building Energy Act (GEG) on 1 January 2023 and the associated increased requirements in new construction (further reduction of the permissible annual primary energy requirement) - which is why construction costs and construction prices diverged further in the first quarter of 2023.

Against the backdrop of the effects of the Corona pandemic and the ongoing war in Ukraine with massive price increases for fuels, petroleum-based building materials and certain building products, a rapid normalisation of the development of construction prices and construction costs cannot be assumed for the course of 2023.

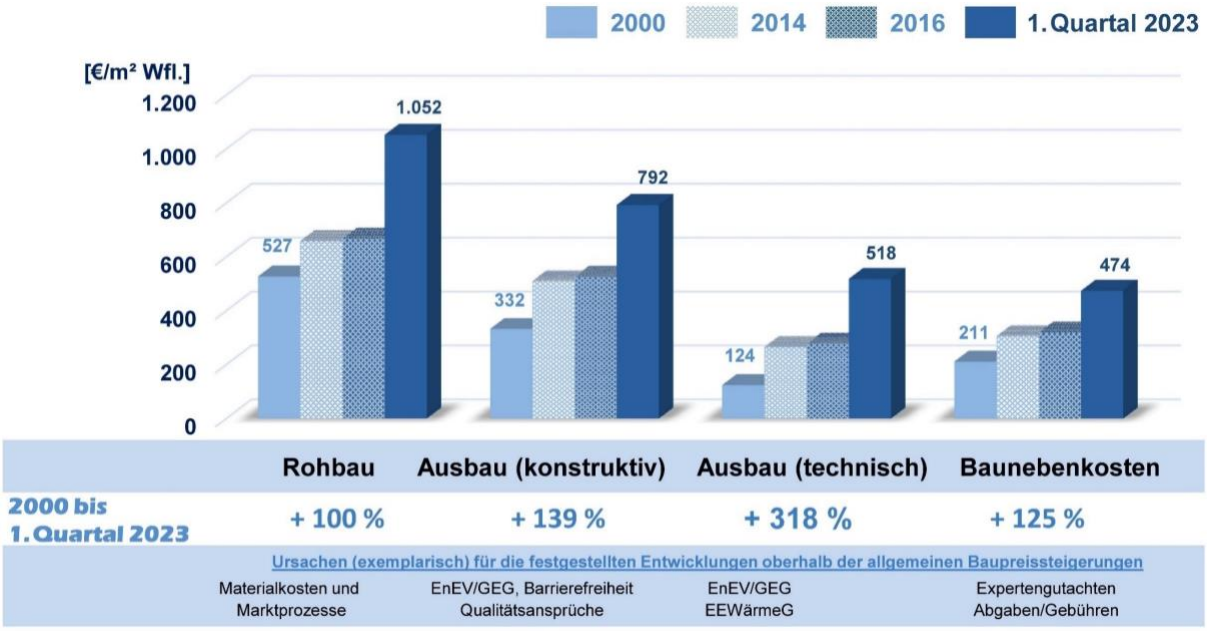


Figure 14: Development of building costs in new residential construction (ARGE cost index, reference type building^{MFH}), taking into account VAT, differentiated according to higher-level service areas with mention of ancillary building costs; period: 1st quarter 2000 to 1st quarter 2023; cost data in euros per square metre of living space
Source: Controlling and data archive ARGE eV as well as surveys on behalf of the public sector in cooperation with the housing industry.

By far the strongest cost development can be seen in the area of building costs in the technical expansion: Compared to the base year 2000, a cost increase of 318 % becomes apparent in the 1st quarter of 2023. The constructive area of the extension also shows a relatively high cost development of 139 % compared to the year 2000. This is due, among other things, to

higher requirements and demands in connection with energy efficiency[31] , accessibility and the changing quality demands in residential construction. The lowest cost increase, 100 %, is in shell construction. Here the development is above the general inflation, but still just below the changes in construction prices.
The fact of a changing distribution in building costs not only has an influence on the level of shell construction and finishing costs, but also on the useful life of residential buildings.[32] The average useful life of buildings results from the proportional costs of building components in connection with the corresponding useful lives and the associated replacement frequency and is thus today only approx. 36 years for this type of consideration of a representative (reference) residential building.

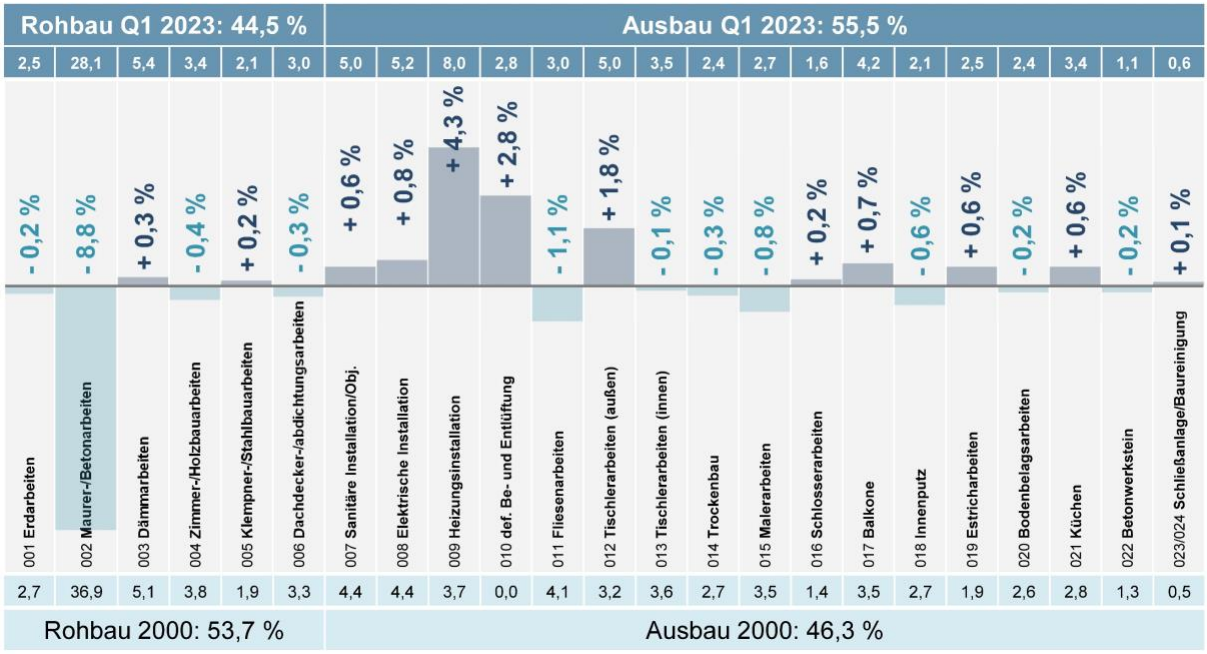


Figure 15: Development of the percentage shares of the individual trades in the construction costs of new residential buildings (ARGE cost index, reference type building^{MFH}) taking into account VAT;
Period: 1st quarter 2000 to 1st quarter 2023; in percent
Source: Controlling and data archive ARGE eV as well as surveys on behalf of the public sector in cooperation with the housing industry.

The research shows that quality standards have now been exhausted in terms of construction costs.[33] Awareness of the connections between quality and costs is one of the fundamental prerequisites of construction-engineering and cost-optimised building. As early as the planning stage, it must be examined whether certain cost-intensive designs and equipment are necessary and appropriate in the intended manner. However, these considerations are opposed by fundamental trends in the current development of demand, which show ever higher quality requirements in both owner-occupied and rented housing.

In view of the strong development of construction costs on the one hand and the increasing overload of the entire construction value chain (planning, executing, producing as well as regulating participants) on the other hand with the entire range of regulations applicable to construction (standards, laws, regulations, ordinances and building regulations, etc.) that have grown up, an important discussion has developed about the qualitative standards for residential construction. This is about the fundamental question of which constructional,

[31] [ARGE 2019b]
[32] Definition from "Nutzungsdauertabellen für Wohngebäude" (Pfeifer, Bethe, Fanslau-Görlitz, Zedler): "The useful life of structural and plant components of residential buildings is the period of planned use with constant permanent requirements, economic efficiency, environmental compatibility and suitability for use", the useful life can therefore sometimes differ significantly from the service life.
[33] cf. [ARGE 2013], [ARGE 2019b].

technical and functional standards are desirable and realisable, and which seem dispensable and superfluous beyond a quality standard to be defined jointly.

The model of "Building Type E" is the benchmark for an absolutely necessary discussion about the current and future target standards in German housing construction, starting from an initiative of architects from Bavaria, through and via the chambers of architects and engineers of the federal states up to the federal chambers of architects and engineers. The following text in the explanatory boxes[34] describes the initiative and the state of the discussion that is currently **bringing** "Building Type E" into the professional discourse nationwide.

Building type E

In addition to the existing system of building classes in the Building Code, building projects can be assigned to building type "E", in the sense of "Simple Building" or "Experimental Building"; like the special building combined with the existing classes for fire protection e.g. to building class "E 3". For these projects, the standards and guidelines referred to in Art. 85a of the Model Building Code (MBO) do not apply in full. In principle, the protection goals of the building regulations, § 3 (more precisely in § 12-16) apply: Stability, fire protection, healthy living conditions and environmental protection. The reason for classification in "E" can be the application of a simplified construction as well as the attempt to create affordable housing or the conversion of an existing building structure for new requirements. At the beginning of an "E" project, there is a careful, joint definition between planners and builders of the goals and qualities, which are agreed upon free of standards, but can be oriented towards them. This statement makes the characteristics of the building permanently transparent. Visible labelling of the new building type "E" indicates to the clients that it is a building with reduced compliance with standards. It is then possible to work with a greatly reduced set of regulations, which enables clients and planners to adapt standards, materials and execution details to each other, so that appropriate and sustainable buildings are created at affordable costs. In addition to the common definition of goals, sustainability also includes good design and coordination with user needs. The classification in building class "E" is accompanied by an opening clause in § 633 of the German Civil Code (BGB), which resolves the private-law claims to the standardised standards and gives building owners a free hand. In order not to weaken consumer protection, "E" is initially made possible for knowledgeable building owners, such as municipal housing associations. This change is necessary because the binding to the body of guidelines and standards has become established at two ends. On the one hand, as part of the Technical Building Regulations via the Building Code, and on the other hand, as the Generally Recognised Rule of Technology via the debt of a defect-free work via the German Civil Code. We want to limit both obligations for the building type "E". By doing so, we do not change the system of regulations or start to change individual standards. We are opening up a new planning path that leads into a new space of possibilities.

[34] Source: Florian Dilg, architect and urban planner from Munich for the Federal Chamber of Architects, lecture at the 690th Schleswig-Holstein Building Talk "Building Class E - or what standards do we need?" of the Arbeitsgemeinschaft für zeitgemäßes Bauen e.V. on 15.03.2023 in Neumünster.

Possibilities of building type E

More freedom for innovative and resource-efficient building. Building owners regain the freedom to decide on their projects if they want to break new ground in building. They are given the opportunity to build with fewer standards and thus more cost-effectively. The release from many directives is compensated for by the support of architects and specialist engineers who, with their competence, observe the basic rules of building. There is again room for innovation through simplification, cost reduction and resource saving through normalisation of standards and land use. Ideas for renewal in building do not remain just theories that have to stand up discursively against the standards apparatus, but can be tested, experienced and evaluated in real life. We expect many good examples that provide impulses for further development in the most diverse directions. The conversion of buildings will become easier, as the change of use-specific requirements need no longer be an obstacle. Necessary new directions in building, such as increased conversions with re-use of the existing stock and circular building can develop without conflict with existing standards. The existing stock can be used as a valuable resource, as the reused building elements have their value outside the standards. Leaving the narrow track of standards is one of the foundations for the development of a climate-friendly conversion culture. After all, the main issue here is the freedom to develop intelligent planning and design with precisely fitting constructions, where the question of HOW must inevitably lead to innovations, since there are often no standard solutions and the greatest possible reuse of existing building materials makes this necessary. Architects and engineers can more creatively contribute their design expertise to building development and take responsibility in the development of society. By making it easier for small and medium-sized craft enterprises to access the market, the "E" building type can revive price competition in construction projects.

State of the discussion on building type E

We have discussed this initiative with all political parties over the past 2 years and last year founded a working group at the level of the Federal Chamber of Architects. This is accompanied by a discourse with colleagues, civil engineers, universities, representatives of the housing industry, lawyers and the professional liability insurance. In the summer, the Building Committee of the Bavarian State Parliament supported our request across all parliamentary groups and wants to initiate a corresponding regulation. The Federal Chamber Assembly unanimously passed a resolution in support of building type E. The Hamburg Supreme Building Inspectorate is interested in incorporating the objectives of the concept into an amendment of the HBO.
We are currently trying to find solutions for the individual legal aspects of implementation and are holding expert discussions with engineers from the specialist planning fields. The Bavarian Ministry of Construction is currently preparing the tender for a series of pilot projects to explore the possibilities of building with type "E".

Current "Possible Practice" examples, analogously comparable with "Building Type E", also exist in current housing construction practice: Construction-optimised new buildings, for example in Büdelsdorf by the Baugenossenschaft Mittelholstein eG /BSP - Bock, Schulz und Partner Architekten BDA Kiel - within the framework of the "Facilitated Construction" of the Social Housing Promotion Schleswig-Holstein; and the implemented examples of the "Kiel Model" based on the planning aid for this form of optimised construction, at the same time as a reusable offer for short-term housing for high needs (refugees etc.) and permanently usable as sustainable housing, cf. [Holz et al 2015].

2.2 Material prices and availability

The international market situation in the area of building materials has an increasingly strong influence on the development of building and construction costs.[36] Internationally traded goods, such as steel, iron and non-iron, electronic components, but also wood, are exposed to much stronger market fluctuations than locally marketable materials such as stones, bricks, concrete, cement, gravel and sand, which also have a relatively denser network of storage and production facilities in Germany.

In the middle of the Corona pandemic - since the third quarter of 2020 - prices have risen particularly sharply, especially for some internationally traded building materials - the price development was in part very volatile and intensified or accelerated again, for example, due to problems in global freight traffic, shifts in demand, production restrictions and failures as well as intensified supply chain problems as a result of the Russian invasion of Ukraine on 24 February 2022.

Even though the supply and demand situation for the building materials concerned has stabilised again in the meantime - among other things through the inclusion of new sources of supply or other suppliers - the material prices nevertheless remain significantly above the pre-crisis level. The main reasons for this are the continuing high energy prices and rising procurement, production and transport costs.

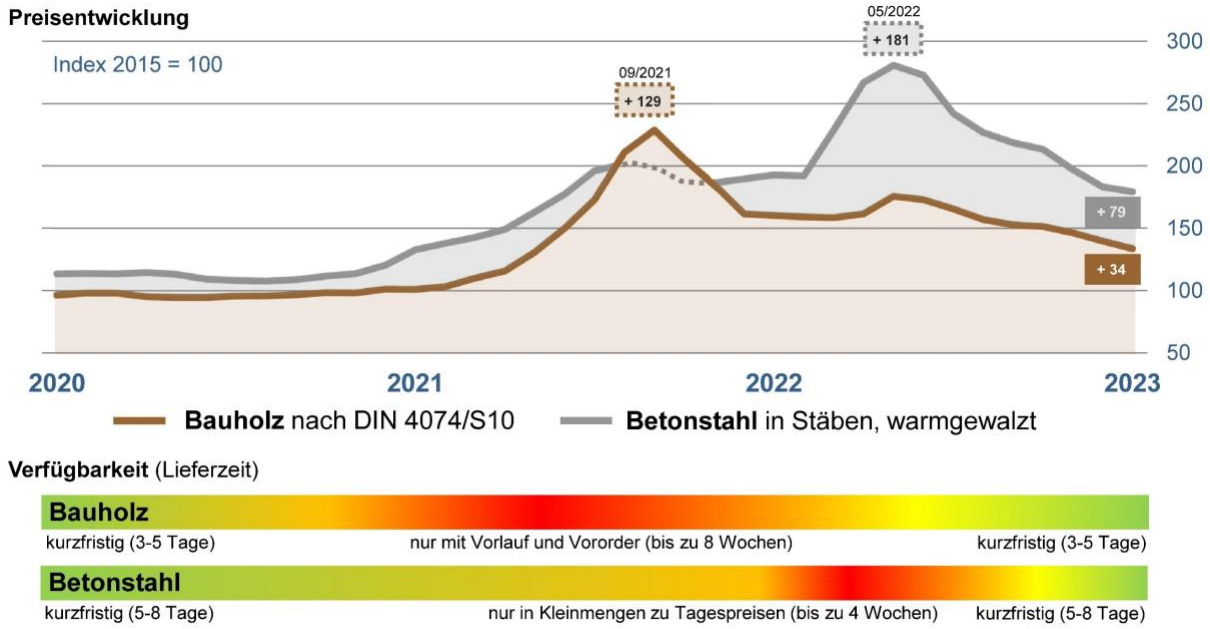


Figure 16: Price development and availability (delivery time) for materials used in residential construction using the example of construction timber according to DIN 4074/S10 and reinforcing steel in the period 2020 to 2023
Source: Federal Statistical Office, wholesalers and specialist retailers in Germany, own presentation

As a result, the availability of several internationally traded building materials was temporarily limited between the third quarter of 2020 and the third quarter of 2022. Metallic materials, timber, but also plastics and certain composites and insulation materials were most affected by sharply rising prices and supply problems (including long delivery times). In contrast, mineral materials showed rather average (inconspicuous) price developments in this period and were not affected by the aforementioned supply problems.

[36] [ARGE 2022b], [ARGE 2023]

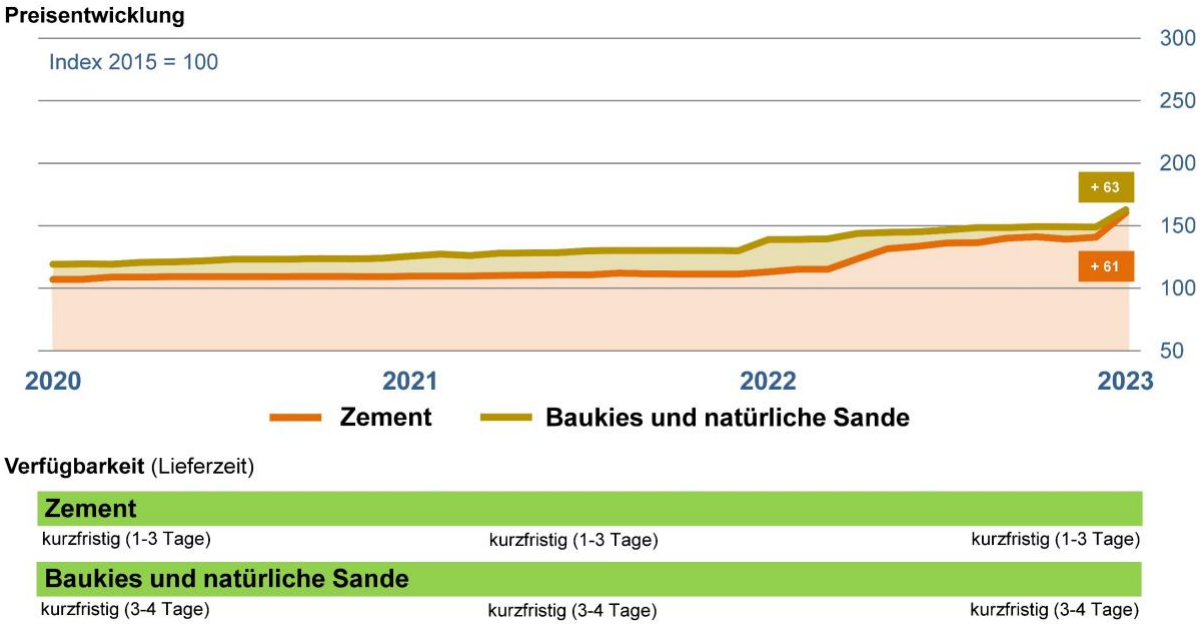


Figure 17: Price development and availability (delivery time) for materials used in residential construction using the example of cement and construction gravel and natural sands in the period 2020 to 2023
Source: Federal Statistical Office, wholesalers and specialist retailers in Germany, own presentation

Since the 4th quarter of 2022, the availability of internationally traded building materials has also been restored and normal quantities (including stock quantities) can be procured without problems at normal delivery times. [37]

Examples and reasons for the above developments:
Massive price increases and supply problems were recorded for EPS insulation materials, for example, but also for (construction) timber. There are various reasons for this. On the one hand, a large production plant that supplied the raw materials styrene and propylene oxide for the production of EPS insulating materials broke down, which led to supply bottlenecks and thus also to price increases. On the other hand, the severe onset of winter in 2020 in the USA led to a drastic reduction in timber production, with increased demand for timber from Europe and the USA and an export stop on the part of Canada. Severe damage to the domestic tree population made it necessary to increasingly source timber from international markets. At the same time, China, the largest container market, was down for a short time, so many products could not be shipped. Germany had a surplus of timber infested with bark beetles. Much of this - so-called calamity wood - was and is exported, especially to China and the USA. At the same time, fresh felling was curtailed, as only 85 percent of the usual amount is currently being felled due to the Forest Damage Compensation Act. Added to this are the forest fires in the USA and the disputes in world trade, especially between Canada and the USA. As a result, the USA has turned to Germany as Europe's largest timber producer, so that German timber is increasingly being exported to the USA. As world market prices have risen, the price of wood in Germany has also gone up. One year later: The price of wood has calmed down considerably, and material prices in this segment have come back significantly from their highs in the third quarter of 2021, although not to the previous price level of the beginning of 2020. It can be assumed that prices will never return to the initial level before this development, as (construction) wood, among other things, was sold at far too low a price for many years. In the future, the use of wood in the primary construction of residential buildings will therefore become even less economical than it is now and has been in the past.

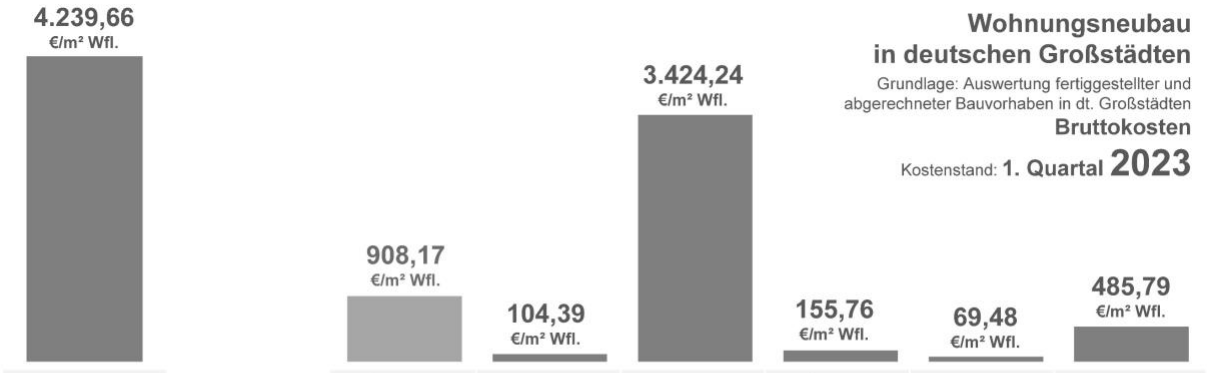
[37] According to available data and information from wholesalers and specialist dealers in Germany.

In particular, internationally traded goods, such as steel, iron and non-iron, electronic components, but also wood as building materials in residential construction have a strong cost-driving effect in the case of supply shortages and/or high demand pressure, whereas mineral building materials with relatively constant and low price increases have a stabilising effect and, in their importance for the shell constructions of residential construction, can be determined as fundamentally cost-reducing even in difficult market situations.

However, the energy price developments of the last 14 months have also had a negative impact on the production costs and thus increasingly on the relevant building material prices.

2.3 Prime costs for residential construction in German (major) cities

In addition to general price increases, increased quality demands and regulatory requirements, for example with regard to energy efficiency, accessibility, stability, fire and noise protection, snow, storm and earthquake safety, as well as a multitude of municipal requirements, have led to significantly higher costs in residential construction, especially in recent years. Dynamic regulation and the complex structure of technical standards prevent small and medium-sized enterprises (SMEs) in particular from achieving economies of scale and thus becoming more productive. Instead, they have to cope with ongoing management of the building code toolbox, which burdens the general cost of doing business.[38]



Herstellung KG 200-700 (mit 810-890 teilw.)	Kostengruppen gem. DIN 276 (2018-12)	Grundstück KG 100	Vorbereitende Maßnahmen KG 200	Bauwerk KG 300/400	Außenanlagen und Freiflächen KG 500	Ausstattung z.B. Küchen KG 600	Baunebenkosten (Finanzierung teilw.) KG 700/(800)
3.001,21	von	357,02	16,36	2.618,87	40,14	33,07	285,03
4.239,66	**Median**	**908,17**	**104,39**	**3.424,24**	**155,76**	**69,48**	**485,79**
7.823,58	bis	3.418,58	793,16	6.352,25	540,85	201,49	981,92
[€/m² Wfl.]		[€/m² Wfl.]	[€/m² Wfl.]	[€/m² Wfl.]	[€/m² Wfl.]	[€/m² Wfl.]	[€/m² Wfl.]

Figure 18: Summary presentation of the established construction costs in major German cities as well as the land costs with percentage breakdown according to cost groups (median values); reference: new multi-storey residential construction; cost status: 1st quarter 2023, figures in euros per square metre of living space, incl. VAT (gross costs) Source: Controlling and data archive ARGE eV as well as surveys on behalf of the public sector in cooperation with the housing industry.

The existing cost range for the construction of new apartments currently lies between approx. 3,000 and approx. 7,800 € per square metre of living space (median approx. 4,200 €/m² floor space) and is of a similar order of magnitude in all major German cities.
In principle, the cost level in new residential construction is always directly influenced by the individuality of a project, including the existing project-specific features or primary cost factors .[39]

[38] Cf. [ARGE 2015], [ARGE/Pestel 2018], [ARGE2019a], [ARGE 2021].
[39] e.g. primary cost factors (competitions, expert opinions, planning specifications, construction site logistics, demolition work, explosive ordnance detection/removal, decontamination/soil exchange, excavation pit shoring, dewatering, foundations, underground parking, partial basements/full basements, balconies/loggias, lift systems, energy standards, barrier-free access, quality of outdoor facilities, etc.).

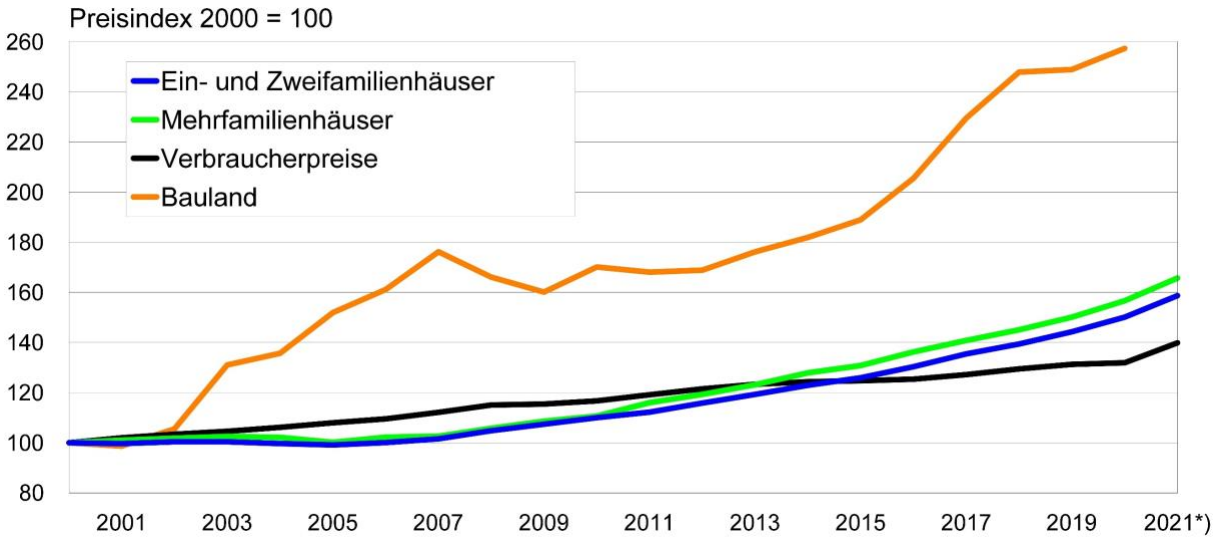


Figure 19: Price development in residential construction and for building land compared to the development of consumer prices Source: [Pestel 2022a] based on Federal Statistical Office; consumer price index until November 2021; prices in residential construction based on the development of the "estimated costs of the structure" for building permits January to September 2021 compared to the same period of the previous year

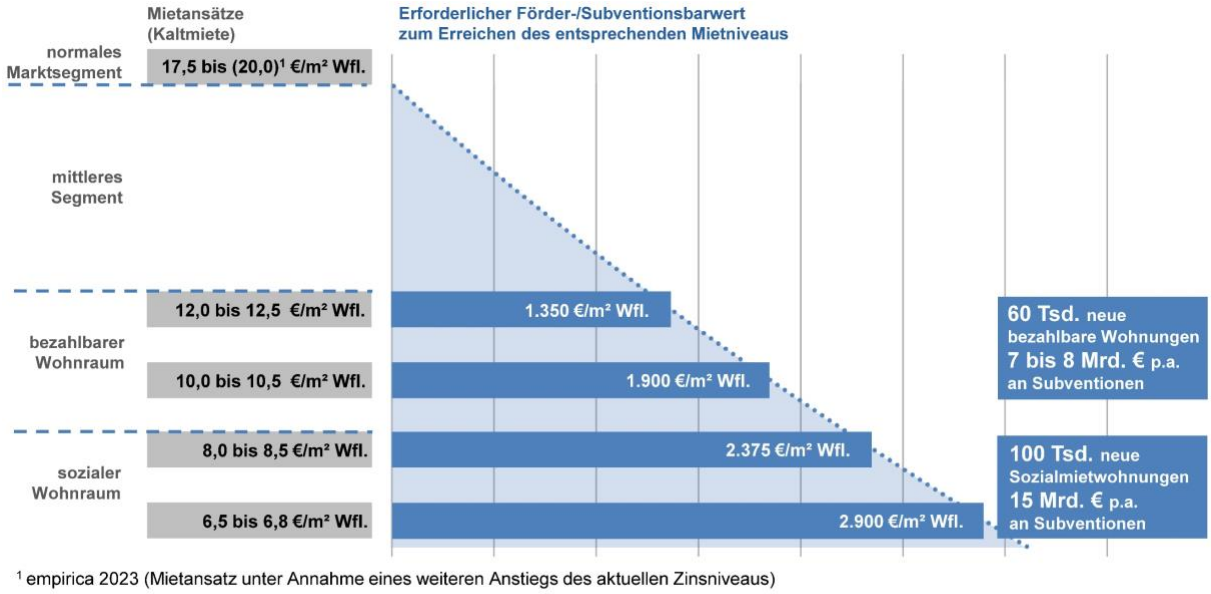
In the evaluated construction projects, e.g. in Hamburg, the interaction of usually between 10 and 25 different project-specific features or primary cost factors can be observed (median per project in Hamburg: 15). This is a typical accumulation in large cities.

In principle, only the cities and municipalities can create building land through their planning sovereignty. This is where the political responsibility for sufficient building land provision lies. In this context, a persistent, structural shortage of building land also prevents an expansion of building activity in the conurbations.

Scarcity leads to price increases; this also applies to building land. The development of building costs and prices for building land is shown in the figure above.

The decline in construction activity in the second half of the 1990s obviously no longer allowed for price increases. It was only from around 2010 that the price index of residential construction again approached the development of consumer prices and the construction costs of multi-family houses exceeded this index in 2016 for the first time since 1995, now also with an increasing trend. This contrasts with the development of building land prices, which have increased by around 160 % since 2000 until 2021 alone.

Land costs in new housing construction projects already comprise an average of 20 % of the total investment costs in major German cities. An end to this development is currently not in sight.



[1] empirica 2023 (Mietansatz unter Annahme eines weiteren Anstiegs des aktuellen Zinsniveaus)

Hinweis: Ermittlung der Förder-/Subventionsbarwerte durch die Investitionsbank Schleswig-Holstein (IB.SH) ; Marktansätze (Stand: 03/2023) unter anderem mit 4,00% Zins (33J.), 1,50% Tilgung

Figure 20: Presentation of the results based on a long-term dynamic investment calculation to determine the subsidy/subsidy cash value in connection with certain necessary cold rents at investment costs of 5,000 €/m² Wfl. in housing construction
Source: IB.SH - Investitionsbank Schleswig-Holstein, own presentation

At the current median investment cost level of approx. 5,000 €/m² floor space in German multi-storey residential construction in large cities, this must be rented out for approx. 17.5 € (lowest approach) to approx. 20 € per square metre of living space (cold rent). Other calculations arrive at even higher necessary cold rents of between € 23 and € 25 per square metre of living space (cold rent) with a differentiated approach of equity capital and repayment/redemption period etc.

In order to aim for a necessary cold rent in the range of 10 to 10.5 € per square metre of living space, a subsidy or subsidy cash value (for example, from grants and low-interest/interest-free loans) of approximately 1,900 € per square metre of living space is necessary.

In order to reach the level of an affordable basic rent of approx. 8 to 8.5 €, i.e. affordable for more than 60 % of tenant households in Germany, a subsidy cash value of approx. 2,375 € per square metre of living space is required. In order to reach a target limit for the basic rent - as usually applied in social housing promotion - of generally less than 7 € per square metre of living space, a subsidy cash value of about 2,900 € per square metre of living space is required.

If the goal of achieving an adequate number of dwellings in the affordable housing segment or even social housing in Germany is to continue to be pursued, these costs for equipping adequate support programmes on the part of the federal government and the Länder must be calculated.

2.4 Cost drivers in residential construction

- In the case of certain building products and building materials, there has been a very dynamic price development in recent quarters, combined with a high degree of fluctuation at partly very high price levels. Even if the situation has stabilised again with regard to the availability of internationally traded building materials, the still obvious price levels continue to drive up costs.

- In addition to price increases, higher quality standards and regulatory requirements, for example with regard to energy efficiency, accessibility, stability, fire and noise protection, snow, storm and earthquake resistance, as well as a large number of municipal requirements, have led to significantly higher costs in residential construction, especially in recent years.

- Dynamic rule-making and the complex structure of technical standards prevent small and medium-sized enterprises (SMEs) in particular from achieving economies of scale and thus becoming more productive. Instead, they have to cope with ongoing management of the building law toolbox, which burdens the general cost of doing business.

- In addition to these significant cost increases, a fundamental change in the distribution of building costs could be determined in the course of the detailed analyses of building costs. Between 2000 and 2023, the focus of costs has shifted more and more from the service areas of shell construction to the service areas of finishing. In today's construction practice, the share of costs for the finishing trades is 55.5 %. The main reason for this is the above-average price and cost increases in the finishing sector, which are largely due to stricter legal requirements, normative specifications and changed quality demands in residential construction.

- This change in the distribution of building costs results in certain effects for residential construction that have a negative impact on their useful life in particular. Due to the increased share of costs in the "short-lived areas", especially with regard to the "technical installations" with partly very short replacement intervals of individual components, the useful life of the buildings is visibly shortened. From a fiscal point of view, the average useful life of all components of a new building has meanwhile reached an average value of less than 36 years for residential buildings for the reasons mentioned above and also continues to show a clearly negative development trend. This increased wear and tear on buildings is associated with an increasing need for investment in building maintenance. Therefore, a continuing adjustment of depreciation possibilities to the actual value consumption in modern housing construction should be examined.

- The scarce building land situation and thus also the development of land costs have an additional exacerbating effect. Studies of housing construction costs in conurbations and large cities, e.g. in Hamburg, have shown a median increase in land costs of around 40 % from 2016 to the present.[40]

- Surveys to identify cost drivers in housing construction with the participation of 1,500 housing companies have revealed a multitude of further cost-driving points or problem areas. These range from special costs in the context of planning procedures to a wealth of costs caused, for example, by municipal requirements or conditions.

In order to identify cost drivers that have a particular influence on cost developments in housing construction in practice, nationwide survey data[41] was systematically analysed and evaluated with the participation of a total of 1,500 housing companies.

[40] e.g. [ARGE 2022c] and ongoing cost monitoring of ARGE eV
[41] GdW, BFW, own surveys

The data collected consists of descriptions, detailed and cost data on the cost drivers of new construction projects as well as information on, for example, the current new construction plans of the housing companies (possibly no more realisation of new construction projects in 2023) as well as the advocated standard reductions (to facilitate the implementation and/or cost reduction of new construction projects). The naming and determination of the cost drivers and the advocated standard reductions were not specified or limited in number, as experience shows that there are usually a large number of cost-driving points or problem areas in construction projects.

The evaluation of the data sets with regard to the cost drivers was carried out according to two different methodological approaches. The first method provides for the specific analysis of the individual cost drivers, i.e. individual evaluations were carried out for each of the named cost drivers. In the second method, the cost drivers were not evaluated independently, but in relation to the construction projects. Since, as expected, the cost ranges are relatively large and thus difficult to evaluate, the median cost values were also determined in this context using the example of growth regions or conurbations. The evaluation methods were designed in such a way that the results can also be shown in relation to the cost groups according to DIN 276.

When considering, for example, municipal requirements or conditions, a large number of different cost drivers were recorded, a list of which is shown in the following figure. It should be noted at this point that the median cost value also shown in the figure was determined for growth regions or conurbations. In this context, the available data also show that the median cost value listed tends to increase and should therefore only be understood as a snapshot of the current situation.

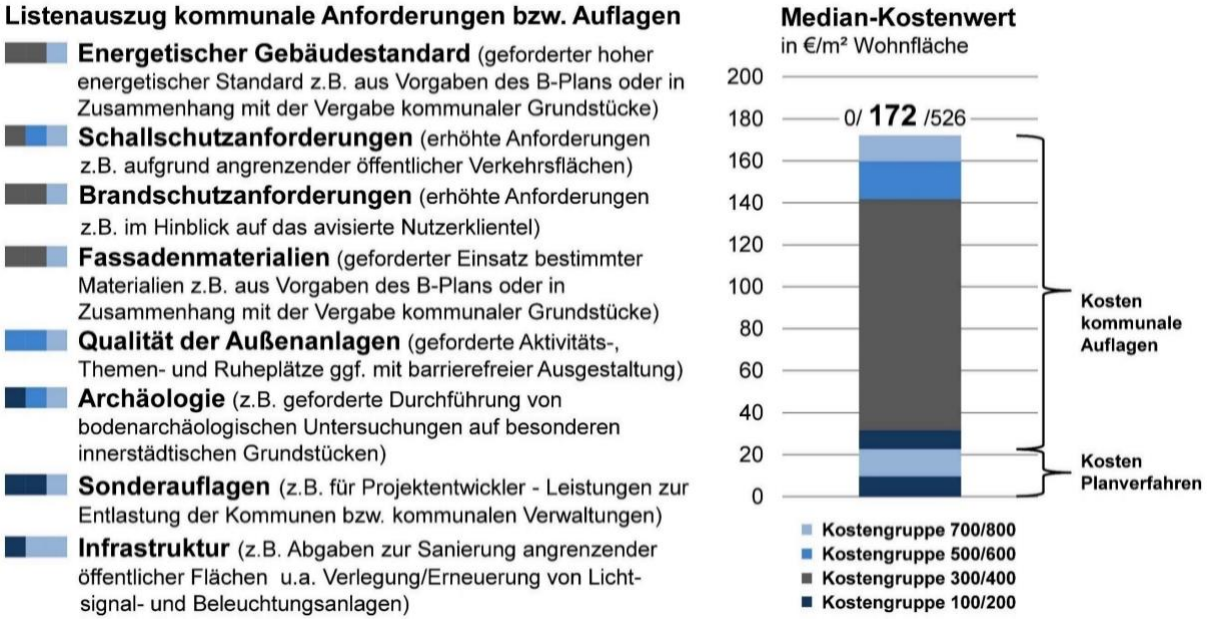


Figure 21: Representation of the median cost value in relation to municipal requirements or conditions incl. distribution to the cost groups according to DIN 276 using the example of growth regions or conurbations.
Source: GdW, BFW, Controlling und Datenarchiv ARGE eV and surveys on behalf of the public sector and in cooperation with the housing industry

Similarly, in recent years, especially in growth regions or conurbations, the transfer of sovereign planning/supply tasks to the investor/developer or his commissioned special experts has become increasingly common, partly due to the severely limited capacities in the municipal administrations. In addition, sales of municipal land are often linked to the submission of e.g. urban development concepts or the preparation or updating of project and development plans or outline/building plans. Furthermore, especially in regions with a tense market situation, new

construction projects have recently increasingly been linked to so-called special levies, e.g. for ecological or infrastructural measures, which have to be paid to the municipality.

The relevant median cost value for the realisation of new housing in growth regions or conurbations with regard to the identified cost drivers in the category of municipal requirements is currently 172 €/m² of living space, i.e. for every construction project in these regions, significant additional costs are to be expected, which must be borne exclusively by the investor/builder or the tenants. The focus of these identified cost drivers is clearly in the building sector, to which municipal specifications for the building structure, the energy standard, structural fire and noise protection as well as for the number of parking spaces, e.g. in connection with increasingly required underground garages in dense urban areas, contribute above all. The fee and planning areas, which consist, for example, of costs for required urban planning/architectural/landscape planning concepts, competitions, planning and expert opinions[42] as well as requirements or fees in the areas of species and nature conservation, geology and infrastructure, currently only account for a subordinate share of costs, but show the strongest development trends. The identified cost drivers in the category of municipal requirements thus lead to significantly higher total production costs. In total, this amounts to an average of approx. 12,600 € for each new flat in growth regions or conurbations.

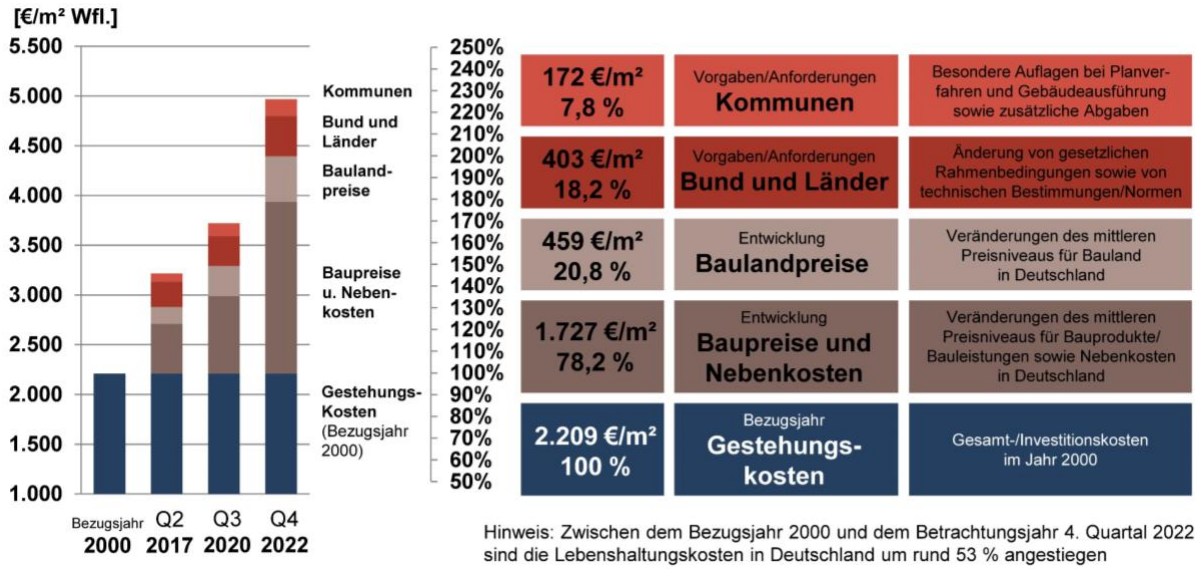


Figure 22: Investment costs and distribution of the recorded cost drivers for residential construction among the respective polluters using the example of growth regions or conurbations, reference: type buildings^{MFH} ; period: 1st quarter 2000 to 4th quarter 2022 (update of the comprehensive study from 2015) [43]
Source: GdW, BFW, Controlling und Datenarchiv ARGE eV and surveys on behalf of the public sector and in cooperation with the housing industry

In addition to the cost drivers in the category of municipal requirements, further cost drivers were recorded in additional categories within the scope of this study. Of these, the cost drivers in the categories of construction prices, energy requirements, building land prices, planning and consulting services, changes in tax law, technical building regulations/norms and quality standards are of overriding importance due to their cost shares.

According to this, the cost drivers that have developed specifically since the reference year 2000 with direct reference to specifications or requirements of the federal government, the Länder and the municipalities (changes in tax law, building permit fees, technical building regulations/norms and quality standards, energy requirements and municipal requirements) amount to € 575/m² living space or € 42,000 per new flat.

[42] [ARGE 2016c]
[43] [ARGE 2015]

Although the average return on equity in housing projects has continued to fall in recent years, at the current level of construction costs and interest rates, housing for smaller and medium incomes, especially in urban locations, can hardly be realised without appropriate funding.

Against this background, the housing companies participating in the surveys were also asked about their current plans for new construction. Here, the companies stated that they wanted to implement significantly fewer new housing construction projects than originally planned. A total of 43% of the housing companies do not even want to realise any new projects this year. In the case of small and medium-sized housing companies, this was approximately one in two, while in the case of the larger housing companies about one in three is currently foregoing new buildings altogether.

According to the survey data, the originally planned housing construction activity is therefore significantly lower than the housing companies had initially planned. Consequently, in the next two years (given the current framework conditions), a strong reduction of new construction activities by approx. 60 % can be assumed.

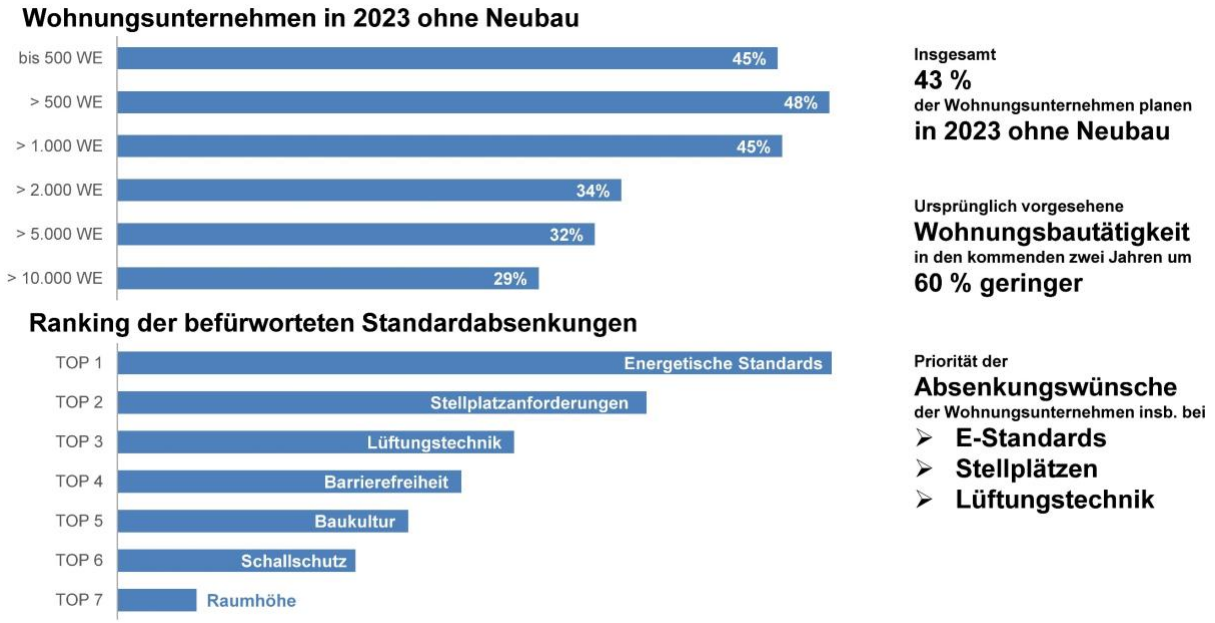


Figure 23: Representation of the shares of housing companies without new construction (planning) for 2023; differentiated according to size classes [own WE] and listing of the ranking of the standard reductions currently particularly advocated by the housing companies
Source: GdW, BFW, Controlling und Datenarchiv ARGE eV and surveys on behalf of the public sector and in cooperation with the housing industry

The surveys also asked where the housing companies saw opportunities to improve the framework conditions, for example by lowering standards, and thus to promote the implementation of new construction projects with achievable cost reductions. According to this, the highest priority for the housing companies in the ranking of advocated standard reductions is given to the topics: Energy standards, parking space requirements, ventilation technology, accessibility, building culture, sound insulation and room height.

Chapter 2.1 of this study also deals with the fundamental issue of lowering standards in residential construction with regard to the considerations and approaches of building type E.

2.5 Housing and climate protection

- With regard to the energy requirements for new housing construction, it should be noted that the relevance of new construction to achieve climate neutrality is many times lower than the renovation of existing buildings.
- Extensive simulation calculations, for example currently within the framework of the feasibility study for the implementation of climate protection targets in the residential building sector of the Free and Hanseatic City of Hamburg[44] commissioned by the Hamburg Senate, show that in the possible scenarios, despite different requirement levels over time, the share of new construction in the total consumption or total emissions of the residential building sector in 2045 is only in the low single digits.

[44] Static building matrix simulation; see e.g. [ARGE 2022a], [ARGE et al 2023].

- The costs of CO_2 - and energy savings through higher efficiency standards in new residential construction show that the standard achieved so far under the Building Energy Act represents the individual and economic optimum. [45]
- Further regulatory tightening for the energy efficiency of new residential buildings must also be accompanied by appropriate support in terms of the benefits for tenants and compensated in a socially appropriate manner.
- Municipal heat planning can present economic savings potentials for new buildings, for the building stock and options for a highly efficient or renewable residual heat supply in a practical way. Therefore, municipal heat planning should be introduced as a regulatory principle. In its own interest and in the interest of the citizens, the municipality is called upon to fulfil its role as moderator and coordinator or as mediator with the relevant actors on site.
- The potential for climate-relevant savings lies in the neighbourhood and in the consideration of the structural context of the buildings - also in the interaction of existing and new buildings, residential and non-residential buildings. Further optimisation of new buildings or energy-related building refurbishment focussed only on the individual building does not lead to significantly improved energy saving effects.[46]
- Furthermore, a practice-oriented extension of the energy assessment to the entire life cycle, including construction, maintenance, replacement of building components and demolition, can be a useful basis for future funding and the assessment of residential buildings. In this context, the verification effort must be kept low. The normative basis for this must be developed by consensus as general rules of technology.
- It would also be desirable to link (federal) funding programmes with a focus on climate protection with social ties.

The challenges to the restructuring of our entire economic system under climate protection aspects are enormous. The German government's targets until 2045 affect all sectors and their potentials. CO_2 emissions in the building sector fell by around 47 % between 1990 and 2022.[47] In 1990, greenhouse gas emissions in the building sector still amounted to 210 million tonnes; by 2022, emissions had been reduced to around 112 million tonnes[48] , despite the fact that the housing stock increased by almost 30 % or by more than 9 million dwellings during this period[49] .

According to the Climate Protection Plan 2050 Federal Climate Protection Act 2021[50] of the Federal Government, greenhouse gas emissions in the building sector are to be reduced by a total of 66 % by 2030 in relation to 1990 levels. The building sector is assigned the most ambitious CO_2 reduction target of all sectors. [51]

A significant difference between the different sectors is the amount of investment needed to save 1 t of greenhouse gas emissions. The median investment required in industry is between €35 and €157 to save 1 t of CO_2 in production and industrial processes[52] , while in residential construction the median investment required is between €950 and €2,750 to save 1 t of GHG emissions (usually) through improved building efficiency[53] .

[45] [ARGE/LCEE/Pestel 2022]
[46] See also Prof. Dr. Norbert Fisch, et al. in [Fisch et al 2021], [ZIA 2022].
[47] [UBA 2023]
[48] The Federal Government: "New Perspectives in Climate Protection - Adapting to Climate Change - Building and Housing", Press and Information Office of the Federal Government January 2022
[49] [DESTATIS 2022]
[50] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety: Federal Climate Protection Act 2021, Berlin 7.7.2021
[51] [BMUB 2016]
[52] [McKinsey 2007]
[53] Cf. [ARGE/LCEE/Pestel 2022], [ARGE 2022a]; updated cost analysis, 12/2022

The decisive lever for the transformation of the residential building sector lies in the modernisation and climate-neutral adaptation of existing buildings and the decarbonisation of energy sources.

A total of 60.1 % of residential buildings in Germany were built before 1979.[54] These building age classes are to be regarded as priorities for a sustainable climate protection-relevant renovation offensive. At the same time, this building age class contains the largest share of rental flats and, the older the (post-war) stock, the largest share of flats that tend to have the lowest cold rents.[55]

In the area of multi-family houses, up to 90 % of all flats are rented, especially in the building age classes from 1949 to 1978. The majority of the approx. 6.9 million households in Germany with a monthly net household income of less than €1,500 live in these flats.[56]

The transformation of these residential building stocks in the direction of climate neutrality creates an additional economic connection between existing measures and necessary new construction. From today's perspective, these older residential buildings with a focus on the 1950s construction period and with generally low cold rents between 3.50 and 5.50 EUR/m² are in the worse efficiency classes due to their technical and energetic condition. The clearly decreasing profitability of these properties in the next 5 to 10 years due to, among other things, exponentially increasing maintenance and heating costs as well as maintenance costs that cannot be capitalised, put the housing companies that maintain the existing stock, e.g. the cooperatives, under short-term pressure to act. Here, it is important to realise new housing with equity-preserving subsidies, i.e. ideally with social housing subsidies and with significantly more rentable living space. In the medium term, these properties have a "cash flow stabilising" effect for the company as a whole and provide the economic basis for the necessary modernisation measures in the housing stock. In addition, the subsidy has the effect of lowering rents overall and thus relieving the housing market.[57]

Further regulatory requirements for the energy optimisation of buildings should be oriented towards a logic of technical and economic balance between individual buildings and buildings in neighbourhoods and the urgently needed decarbonisation of the energy supply.

If the buildings are not considered as individual buildings, but as a neighbourhood network, it can be assumed that the space availability can be designed more flexibly, as the open space design of the neighbourhood can be adapted more to the concerns of the energy supply. At the individual building, this leeway is only available to a much lesser extent. In particular, the use of renewable energies for heat supply can often only show its advantages in larger contexts due to economies of scale. For this reason alone, options for action in housing construction that arise at the level of the spatial context of a neighbourhood must henceforth be given special focus.[58]

Since current and future new residential construction will probably account for about one tenth of the residential building stock in Germany in 2045, the energy requirements for these buildings should also be geared towards achieving climate neutrality as early as possible.

[54] Census 2011, DESTATIS as well as own calculations and surveys on behalf of the public and in cooperation with the housing industry
[55] DESTATIS, [Pestel 2020], [ARGE 2022a].
[56] DESTATIS, "Housing - Type of dwelling unit use by households - Households owned or rented by household structure dwelling unit 2018", as of 8 July 2020.
[57] Conducted analysis of the prerequisites for social housing promotion and the economic situation of housing cooperatives in connection with the establishment of long-term carbon footprint and decarbonisation strategies; Arbeitsgemeinschaft für zeitgemäßes Bauen e.V., March 2023.
[58] [ARGE et al 2023]

However, it should be borne in mind that the relevance of new construction is much lower than that of renovating existing buildings. To illustrate this, the results of simulation calculations based on the practical SGMS model of ARGE eV can be used, according to which in the possible scenarios, despite different requirement levels over time, the share of new construction in total consumption or in total emissions of the residential building sector in 2045 is in the low single-digit range.

It is fundamentally true that choosing a higher efficiency standard reduces energy consumption and CO_2 emissions, but it also leads to significantly higher costs. In particular, the higher costs for maintenance, servicing and the replacement of components over the 50-year observation period, which were often neglected in the past, have a negative impact on economic efficiency. Consequently, the costs of CO_2 and energy savings with higher efficiency standards in new residential construction also show that both individually and economically, the standard achieved so far according to the Building Energy Act already represents the individual and economic optimum.[59] Against this background, further regulatory tightening for the energy efficiency of new residential buildings, also with regard to the benefits for tenants, only makes sense in the medium term if they are accompanied and compensated for by subsidies.

The marginal costs for higher new building requirements increase exponentially. The marginal benefit, i.e. the additional avoided CO_2 emissions, approaches zero.

Source: [Empirica 2023a], Cf.

[59] [ARGE/LCEE/Pestel 2022]

3. at the tipping point

3.1 Housing is a complex system

The current crises have taught us painfully how complex the interconnections of economic supply chains, raw material production and energy supplies as well as the production of necessary products have become worldwide. In the last three years, with the Corona pandemic and the war that has been raging in Ukraine for over a year, this fact, which has actually been known for a long time, has been catapulted decisively into public awareness. At the same time, we find ourselves in a progressive climate change for which we must also find solutions that are both technically and economically feasible and - above all - purposeful.

These questions apply to a complete planetary system, to national strategies in the context of transformation processes towards the required climate neutrality and, of course, also to such a large economic sector with its overriding social importance as housing.

Complex systems, such as economies, ecosystems, social networks and technical infrastructures, are characterised by complexity and interconnectedness. The long-term build-up and short-term collapse of such systems can be due to various factors.

Long-term build-up:
A complex system usually emerges through a step-by-step construction in which small elements are connected to form larger structures. In the process, emergent properties can emerge that are based on the interaction of the individual elements and that characterise the system as a whole. The long-term build-up of complex systems can also be reinforced by positive feedbacks. If a property of the system promotes growth, this can lead to further elements being added, which in turn reinforce the growth. As a result, the system can grow very quickly and exponentially.

Short-term collapse:
However, complex systems can also collapse in the short term if certain critical thresholds are exceeded or if the system suddenly becomes unstable. This can be caused by negative feedback, where a disturbance of the system leads to further disturbances. Another possibility is that the system is disrupted by an external disturbance, such as a natural disaster or a hacker attack. In some cases, the system may also be destabilised by its own emergent properties. For example, a banking system can collapse due to speculation, over-indebtedness or even necessary revaluations of a portfolio, even though each individual actor has acted rationally.

In summary, complex systems are due to both long-term build-up processes and short-term breakdowns that can be caused by a variety of factors. The analysis of complex systems therefore requires a deep understanding of the dynamics and interactions of the elements within the system, as well as the effects of external influences on the system.

"*How can we turn things around in the complex world we live in today? ... Where do we need to start in order to change the structures of our present in such a way that they better serve the achievement of our goals instead of standing in their way?*" asks Maja Göpel in her introductory, important contribution to current fundamental debates about the "great transformation to a better world".[60] In this book, an attempt is made to explain very clearly how "complex systems" work and to show a systemic view of possibilities for change and of the spectrum of possible strategies and solutions. The definition of complex systems is based on

[60] [Göpel 2022]

the fundamental work on the functioning of systems and systems thinking as established (among others) by the environmental scientist Donella H. Meadows (1941-2001).[61]

There, it is described in particular that complex systems have three essential characteristics:

1. an interconnectedness
2. a **temporal dynamic**
3. a **purpose** (or **function**)

In her book "The Limits of Thought", the understanding of complex systems plays a role in particular because it is intended to stimulate a "revolution of human thinking" in order to change from the usual "linear thinking" to "systems thinking" in order to better understand interrelationships, such as complex natural processes, in order, for example, to classify the ecological footprint of humans on this planet and its effects and thus to better influence them.

The tipping point, also called the tipping point, refers to the point at which a system suddenly and irreversibly transitions from one state to another. It is usually a critical point where a small change in the system - even by omission - has a major impact on the behaviour of the system.

Tipping points can occur in many systems, including social, environmental and economic systems. It is important to understand and avoid tipping points as they can often have unpredictable and undesirable consequences.

In principle, exactly the same applies to housing construction: Housing is a very complex system. It has all the features that characterise a complex system:

1. the interconnectedness of housing starting with the complex structure of the different levels

-regulators : legislators, standardisation institutions, lower building supervision, upper building supervision, highest building supervision, self-governments, political committees, parliaments and other public or semi-public institutions, etc.
-Primary recipients and actors: housing companies, property developers, portfolio holders, cooperatives, private and independent investors, tenants, owners, construction companies, construction workers, building materials trade, construction trade and industry, building materials production, raw materials production, etc.
-Secondary rule takers and actors: planners, architects, engineers, experts, assessors, training companies, universities and the entire professional public.

[61] [Meadows 2010]

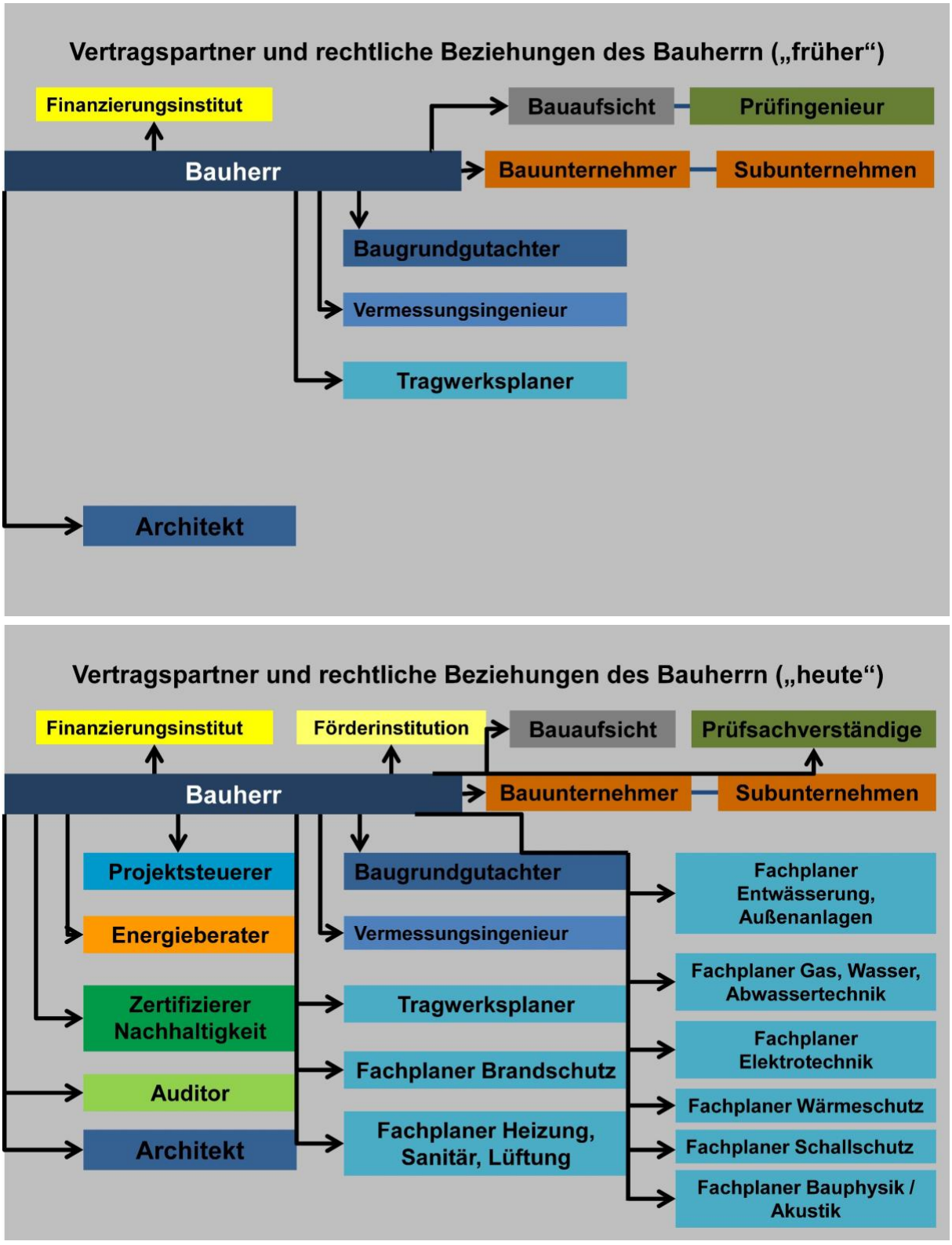


Figure 24: Listing of contractual partners in housing construction and development or expansion of the builder-owner's legal relations from "earlier" to "today
Source: RA Michael Halstenberg, HFK Rechtsanwälte LLP; see [ARGE 2015].

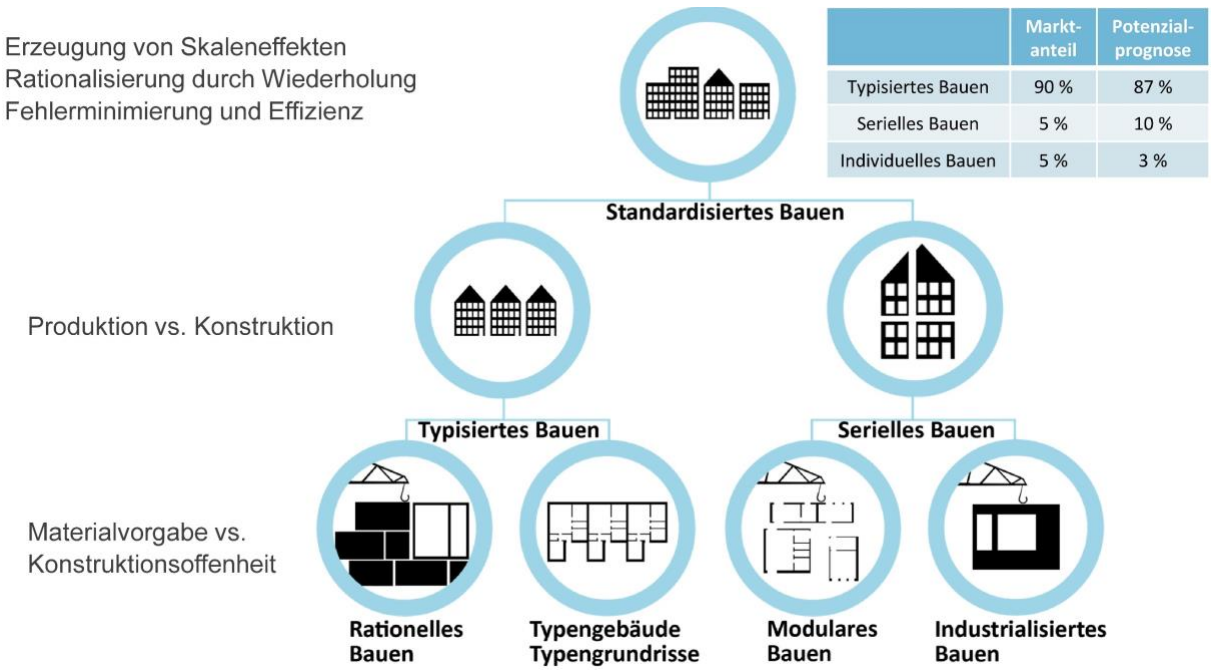
This applies to the entire housing construction system. The above figure clearly shows that the complexity of the client's legal relations in the execution of a building project alone has increased dramatically over the last 20 years.

Given the challenges of creating affordable housing on a considerable scale, it is not surprising that supposedly simple solutions are being sought in order to approach the creation of housing more cost-effectively. Creating construction solutions in series therefore seems at first glance to be a reasonable demand on those involved in the construction process to achieve cost reductions.

At second glance, the issue is more differentiated. If serial construction is to achieve economic effects, it depends on economies of scale. Economies of scale can only be achieved through mass. In recent decades, however, the construction of housing has largely abandoned this idea in favour of more individual solutions. The medium-sized building is the majority product in German rental housing construction, created by a medium-sized construction and housing industry, planned by rather small to medium-sized architecture and engineering firms.[62]

The resulting living space is adapted to the current demands of the market and meets contemporary standards of comfort and quality. Lessons have been learned from past mistakes, and the architectural and urban planning scale is oriented towards a modern model of urban culture. Above all, however, the diversity of today's user demands is taken into account.

All this does not necessarily contradict serial production. But it does at least contradict the introduction of industrialised production methods on a much larger scale in German housing construction. The use of typified buildings and floor plans, without dogmatic material specifications - as is inevitable in serial construction - is much more in keeping with contemporary requirements in housing and urban development. A detail, a building element that is repeated, must be coherent in itself and should also meet regional building culture requirements. Architectural quality does not result from individualisation, just as it does not necessarily suffer from serial production.



	Markt-anteil	Potenzial-prognose
Typisiertes Bauen	90 %	87 %
Serielles Bauen	5 %	10 %
Individuelles Bauen	5 %	3 %

Figure 25 Definition for standardised construction and tabular presentation of market share and potential forecast (typified construction, serial construction and customised construction)
Source: ARGE eV

[62] Cf. [DAfM 2020]

A differentiation of the terms is necessary (see Figure 25) in order to be able to determine suitable procedures depending on the construction projects. Clear definitions and intersections facilitate the schematic procedure and the use of all positive factors. The aspects of series production, repetition factors and simpler cubatures and designs must also be considered here. When these simplifications are applied, the architectural quality is not fundamentally inferior to that of individual planning, but allows extensive leeway in design. The terms individual building, typified building and serial building are to be classified and evaluated accordingly.

Through a combination of intelligent, rational constructions, which incidentally also include functioning construction site logistics, it is possible to plan and construct cost-effective, user-friendly and architecturally sophisticated buildings. For example, prefabricated bathrooms of identical construction can be planned without elementary restrictions on planning flexibility. This possibility also exists with regard to the cost-effective construction of shell buildings with masonry. In this way, all the positive influencing factors in relation to the creation of living space can be combined in a sensible way. The choice of planning approach must always be determined individually for the project.

2. the temporal dynamics of housing construction

Housing construction is a complex system whose temporal dynamics are characterised by the individual project, planning phase, preparation phase, approval phase, implementation phase, net and gross construction time, establishment of urban land use planning, utilisation phase, maintenance, maintenance modernisation, etc. embedded in numerous influencing factors of a superordinate nature and inventory management, with a corresponding view over decades.

The complexity of the implementation of individual building projects (gross construction time) alone shows - as shown in the diagram below - how differentiated the implementation of building projects is to be assessed and how delays in the affordable housing segment in particular have become apparent in recent years. In summary, it can be said that the timely implementation of construction projects has been made considerably more difficult.

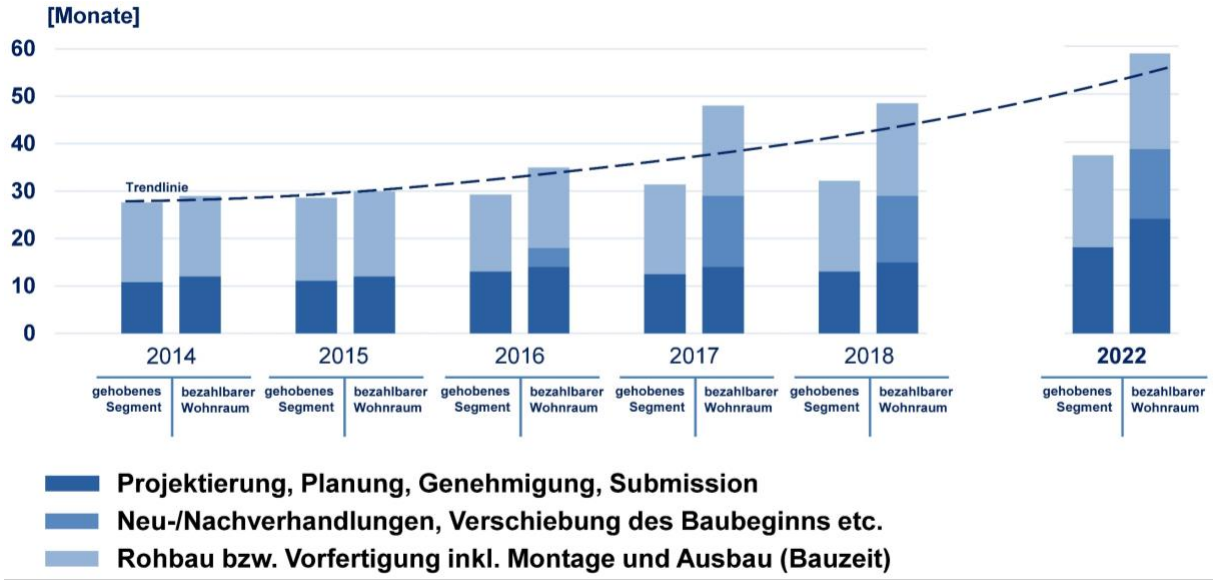


Figure 26: Development of gross construction time in residential construction from project planning to construction completion; differentiated according to the "upscale segment" and "affordable housing
Source: Controlling ARGE eV and surveys in cooperation with the housing industry

From the commissioning of concrete planning services to the building application to the building permit (2-3 years) plus the actual construction period with the corresponding delays due to potential coordination procedures with building supervisory authorities, financial and funding institutions, etc., up to two or three years must be added to the time frame for residential construction projects. In addition, there is the factor - currently difficult to calculate - of construction projects not being realised, for example due to insufficient financing or inadequate funding. "The so-called construction backlog is (thus) no longer a reliable indicator for the housing construction of tomorrow".[63]

3. the purpose and function of housing

Housing has numerous important functions to fulfil, but it is becoming increasingly overloaded with other objectives and issues. In addition to the actual main function of a dwelling, which is to provide a safe, affordable and long-term usable home that can be heated and used for independent household management, new requirements have been added, especially in the last 20 years.

Figure 27: Purpose and function of contemporary housing: goals and conflicting goals/requirements and obstacles/challenges and limits as a conceptual cloud to exemplify the diversity of topics in housing today
Source: ARGE eV

The above figure shows the variety of topics associated with the creation of housing nowadays, as called up by way of example - without claiming to be exhaustive. The single objective is thus often overlaid and housing construction is regularly overloaded economically, functionally and technically. The lesson to be learned from these contexts and the realisation that housing is a very complex system means that there are no simple solutions to flip levers-like strategies to trigger complex (positive) changes as easily as possible. At the same time, it should also be noted that supposedly simple changes in one part of a complex system can rather cause negative effects for the system as a whole.

[63] [empirica 2023]