Colliers

GARBE Institutional Capital

pwc

Obsolescence risks of office properties – residential and life science as a way out?

Executive Summary

The office property market in Germany is undergoing significant transformation, influenced by both short-term economic uncertainties and long-term developments. These include particularly the increasing Environmental, Social, and Governance (ESG) requirements for buildings, as well as changes in the working world, such as the rise of remote working arrangements and "New Work" concepts. The resulting decreased demand for office space, combined with rising construction costs, has significantly shifted the profitability balance from new builds towards renovation and repurposing projects. Many offices do not meet current market standards or legal requirements and require extensive modernisation. However, the changed interest rate and financing landscape complicate refinancing efforts and may affect planned capital expenditure (CapEx) measures. Consequently, a high proportion of office properties is inevitably facing "stranding."

This raises the question of whether there are new uses for these potentially obsolete office spaces and, if so, what challenges need to be considered.

Residential and life sciences have been identified as advantageous repurposing opportunities for obsolete office properties due to several factors: The residential segment benefits from a significant excess demand, which, combined with a significantly reduced supply, leads to long-term economic attractiveness of the sector. The life sciences sector promises attractive fundamentals over the long term due to persistent demand trends, such as an ageing population and the resulting need for medical and pharmaceutical care. Building on this foundation, the aim of this analysis is to illustrate, using an economic model, under which market conditions a conversion appears economically attractive for developers, investors, or real estate funds to make informed decisions about the future use and development of office properties.

Key findings:

- Approximately 75 million square metres of office space, or around 55 % of the total office stock in Germany's A- and B-cities, face economic obsolescence due to the necessary investments required to meet current standards.
- B-cities and city fringe locations are more affected by obsolescence than city centre locations and A-cities.
- Nationwide, up to 24 million square metres of office space could see reduced demand due to working from home quotas.
- Repurposing office buildings for residential use could be suitable for 15-20 million square metres of the 75 million square metres of potentially obsolete space, potentially creating 170,000 - 200,000 new homes in the 21 cities examined and saving 42 million tonnes of CO_2.
- The conversion of office space into life science properties is possible in relevant clusters; however, only a small portion of the obsolete spaces is suitable for this (3-4 %, up to 2.5 million square metres).
- For around 65% of the potentially obsolete office space, there is no direct "escape route" into residential or life sciences use; however, other types of use, such as schools, nurseries, or care homes, might offer a solution.

1. The Office Market Amid Changing Demand Patterns and Property Requirements

The world of office properties is currently undergoing significant change, driven by both short-term and long-term developments. On the demand side, short-term factors like the volatile and challenging economic environment influence tenants' leasing decisions. Long-term trends such as the adaptation to ESG (Environmental, Social, and Governance) requirements and changes in the working world, including the rise of remote working and "New Work," also play a major role. These long-term developments have been exacerbated by the COVID-19 pandemic, which led to a decline in office take-up in the German office markets. The result for 2023 in the seven largest German cities (Berlin, Düsseldorf, Frankfurt, Hamburg, Cologne, Munich, and Stuttgart) shows a take-up of about 2.4 million square metres, a reduction of around 28 % compared to the ten-year average.

Although take-up may increase again with economic recovery, it is unlikely that the peak levels of the years before 2020 (average 2015-2019 in the top 7 cities: approximately 3.8 million square metres) will be reached again in the foreseeable future. The establishment of working from home quotas, which were around 5 % before the pandemic and have since stabilised at roughly 25 %, plays a key role in this. On average, employees work five out of 20 working days per month from home. Taking into account the proportion of office space affected by this change and the proportion of leases that expire annually, a total reduction in space demand of around 12 % by 2030 can be expected, which in Germany's top 7 cities corresponds to an area of around 11.5 million square metres.[1] Extending this analysis to the entire German office market, with approximately 200 million square metres[2], yields the potential for a total reduction of 24 million square metres.

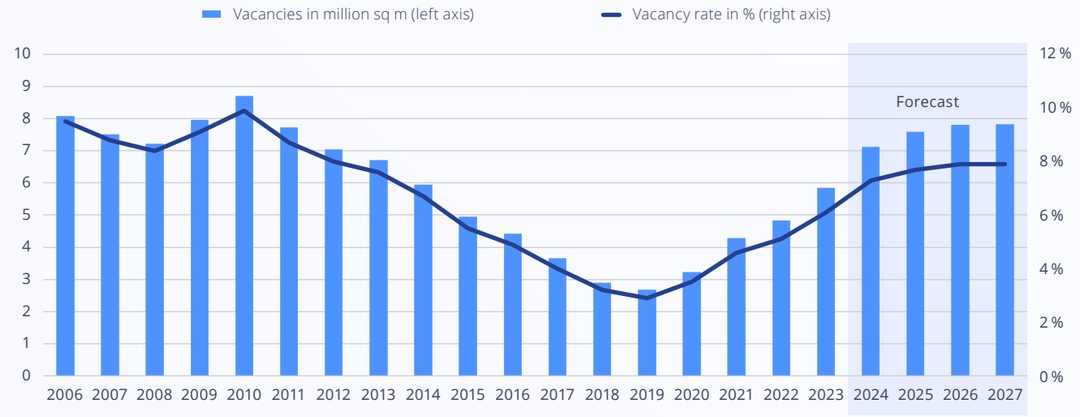
This translates to 24 million square metres of unused or inefficiently used space that still needs heating and generates around 336,000 tonnes of CO2.[3] The emissions volume of this is equivalent to around 28 billion kilometres of car travel, the emissions of 75,000 households per year, 112,000 flights from New York to Frankfurt, or one-third of the annual emissions of a medium-sized coal-fired power plant. However, the economic vacancy also offers enormous savings potential if it can be returned to use – in whatever form – and thus replace some of the need for new construction.

The historically low levels of take-up, combined with altered demand patterns and high completion volumes in recent years, have significant effects on the supply side. The vacancy rate in Germany's top 7 cities has risen from a low of 2.9 % in 2019 to the current 6.4 % (as of Q1 2024) and is expected to increase further to an average of 8 % by 2026.[4]

The challenge for property owners and developers is exacerbated by the changed interest rate and financing landscape, which leads to rising costs. The office market accounts for around € 18 billion of the total debt financing gap by 2030.[5] This figure expresses the additional equity that would need to be injected to maintain a marketable loan-to-value ratio despite real estate value corrections, making financing viable. High debt financing gaps can, in addition to refinancing challenges, negatively impact asset management measures. If capital originally planned for CapEx measures has to be used for refinancing, the planned measures may only be partially implemented or not at all. The resulting need for higher equity volumes to maintain the marketability of properties further increases the real estate quota, while the returns on the additional equity often lag behind the risk-adjusted target returns. Structural changes in the office sector can thus dilute the target return on the (office) property allocation of institutional investors.

Even if the above forecasts regarding the development of office markets should, in individual cases, turn out to be more nuanced in the future, the core statement remains: There is too much office space in the wrong locations and likely too little in the right locations. This analysis is intended to provide some impulses on the possibilities for repurposing without aspiring to scientific thoroughness.

FIGURE 1: VACANCY DEVELOPMENT OF OFFICE SPACE IN THE TOP 7 LOCATIONS



Source: Own analysis.

[1] Colliers/ifo Institute: Effects of working from home on the office real estate market (2024).
[2] RIWIS (Data basis A-D Cities in Germany).
[3] Assumed average energy consumption of 140 kWh per square metre/year at 0.2 kg CO2 per kWh; we assume that 50 % of the energy is used for heating, etc., even if the building is not used.
[4] Only office space that can be occupied within three months is included in the vacancy rate according to the gif definition.
[5] Colliers (May 2024)

2. Conversion potential through stranded assets

Of the approximately 136 million square metres of office space in Germany's A- and B-cities, 59 % were built before 1995, and a further 24 % between 1995 and 2009. Overall, 112 million square metres are at least 15 years old. While the year of construction alone does not reflect a building's quality nor its CO2 emissions, it can serve as an indicator of ageing risks. This refers to "stranding"[6] from an environmental perspective. Vacancies or risks to existing properties caused by remote work may affect even modern buildings aligned with the 1.5-degree path, but it is more likely that older properties will be predominantly impacted, as they form a significantly larger share of the stock. To prevent or at least delay the "stranding asset point" of a property, targeted investments can reduce CO2 emissions. Ideally, such investments not only prevent obsolescence but are also economically advantageous for the owner, meaning that the required CapEx can be covered by correspondingly higher rents, generating a cost return. Location plays a crucial role: while CapEx is almost the same regardless of location, the absolute rent level and potential for rent increases vary significantly depending on the site.

Figure 2 shows how the office stock in A- and B-cities would develop – in terms of the decarbonisation path and depending on the CapEx levels – if investments were necessary in all properties built before 2010 and the economic viability of the measures were a given.[7] In other words, how much office space is at risk of obsolescence depending on the corresponding CapEx?

From the curve of the graph, three distinct inflection points are apparent, from which we derive three scenarios. The middle scenario, which represents a vulnerable stock (stranded assets) with investment expenses of € 5 per square metre per month, is considered the main scenario and serves as the basis for our further analyses:

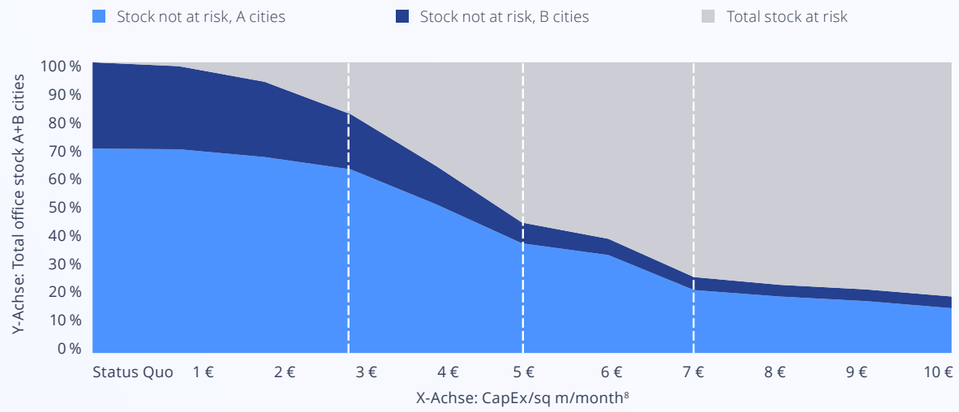
- € 3: Approximately 18 % stranded assets (about 24.2 million square metres)
- € 5: Approximately 55 % stranded assets (about 74.6 million square metres)
- € 7: Approximately 74 % stranded assets (about 100.1 million square metres)

B-cities are somewhat more affected overall due to the lower potential for rent increases than A-cities. In both categories, city fringe and peripheral locations are particularly at risk of obsolescence in their office stock.

This analysis shows that the German office market faces significant risks of ageing. Even in a scenario with low-cost assumptions for ESG modernisation, the share of obsolete office space is 18 % of the stock. The issue is particularly evident in city fringe and peripheral locations, where the question of alternative uses will increasingly arise in the coming years **(Figure 3)**. Repositioning of properties, conversion to residential use, or the creation of spaces for life science users are already frequently discussed in such cases today. However, both alternative uses present individual requirements for the properties and exhibit different regional demand trends, which should be considered when assessing the success prospects of such conversions.

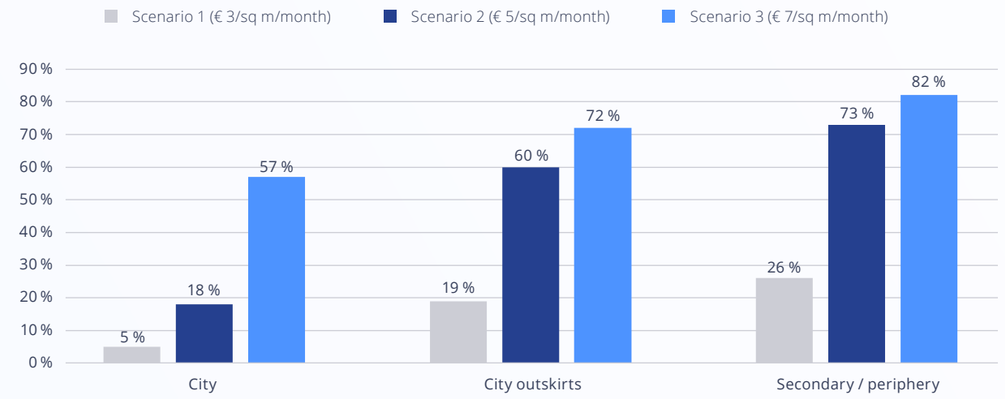
Methodology:
The model provides an overview of the CapEx level (in €/sq m/month) at which significant obsolescence risks arise. The calculation of economically viable CapEx is based on the potential for rent increases, derived from the difference between the achieved rents for high-quality, modern buildings and the rents for older existing buildings in different location categories (city centre, city fringe, secondary/peripheral locations) of the respective cities. A property is considered at risk if the necessary CapEx, including a return of between 5.5 % and 7 % – depending on the location category – can no longer be fully covered by the potential for rent increases, resulting in a permanent economic deficit. For example, a property in a city fringe location of an A-city with a rent increase potential of € 4.50/sq m/month would be considered safe with a CapEx requirement of € 4/sq m/month, but would be classified as at risk with a CapEx of € 5/sq m/month, as the investment would no longer be economically viable **(Figure 2)**.

FIGURE 2: OFFICE SPACE AT RISK OF OBSOLESCENCE AS A FUNCTION OF REQUIRED CAPITAL EXPENDITURE (TOP-21 CITIES)



Sources: RIWIS, own analysis.

FIGURE 3: PROPORTION OF OFFICE SPACE AT RISK OF OBSOLESCENCE WITHIN THE LOCATION CATEGORIES[8]



Sources: RIWIS, own analysis.

[6] The term "stranding" is used below to cover both economic stranding and stranding from an ESG perspective, as the two perspectives overlap. If the necessary investments for ESG measures cannot be realised economically, this results in economic obsolescence.
[7] An average return on costs of 5.5 % in A-cities and 7.0 % in B-cities is assumed for the profitability.
[8] Conversely, with a CapEx share of € 5/sq m/month, this means that a CapEx investment of a maximum of € 875/sq m (= € 5 * 12 / 7 %) is economical with a target cost yield of 7 %. If the rent increase potential does not cover the CapEx share, the existence of obsolescence is jeopardised.

3. Repurposing Potential to Residential and Life Science

To determine the potential for converting office spaces into alternative uses, it is essential to consider both the potential supply of obsolete office spaces and the demand pressure for alternative uses. Methodologically, the following analysis examines the attractiveness of A- and B-cities for residential and life science uses, as well as the existing demand potential. The link is then made to the office spaces threatened by obsolescence, merging both levels of consideration. Taking into account historical data on building stock disposals and conversions, as well as technical and planning restrictions, the total potential for repurposing is derived from this information.

RESIDENTIAL USE

Compared to the large number of unused and potentially obsolete office properties (stranded assets), the German housing market, particularly in major cities and metropolitan areas, faces a tense situation regarding the available supply of housing. The question of whether the space potential outlined in Chapter 2 from obsolete office properties could be repurposed for residential purposes in the future is a frequently discussed topic in the real estate sector.

Change in Housing Structure

In recent decades, the housing structure in Germany has undergone significant changes due to population growth and immigration. However, it is often overlooked that, at the same time, the size of households and the living space per person have also changed significantly. While shared apartments for couples or families used to be common, today there are far more single apartments, especially in large cities. Besides natural population growth and immigration, the smaller household size combined with an increase in living space per person leads to an increased demand for housing. From 1991 to 2021, the average living space per capita increased by around 37 %, from about 35 square metres to about 48 square metres, while the average size of an apartment increased from around 82 square metres to about 92 square metres.[9]

Supply of Housing

Figure 4 shows the average rent in euros per square metre for newly occupied apartments and the potentially obsolete office space per inhabitant for the top 21 German cities. The larger the bubble representing each city, the greater the shortage of housing supply and, therefore, the higher the demand for housing. The supply of residential properties is represented as the absolute number of apartments offered during a year per 1,000 inhabitants of a city.[10]

Cluster 1: High Demand for Housing and High Rents in A-Locations

Our analysis shows that the top 7cities have a high demand for residential space, combined with an average rent for new apartments of over € 14 per square metre. Berlin is the leader in housing demand, with less than ten apartments offered annually per 1,000 inhabitants, and Munich has the highest rent level at around € 22 per square metre.[11] At the same time, it becomes apparent that in A-cities, the number of potentially obsolete areas and, thus, the supply of office space that could be repurposed is relatively lower. An exception is Stuttgart, where the amount of potentially obsolete office space per inhabitant is significantly higher than in the other top 21 cities. This is due to the highest stock of office properties built before 1995 among the A-cities.

Cluster 2: High Availability of Potentially Obsolete Spaces and Moderate Rent Levels

The cities grouped in Cluster 2 have, compared to the other analysed cities (except Stuttgart), a higher supply of potentially obsolete spaces per inhabitant. The shortage of housing supply in these cities is overall slightly below that of A-cities, with particularly high housing demand in cities such as Karlsruhe, Bonn, and Münster. Due to the high number of potentially obsolete spaces per inhabitant and moderate rents, there is increased potential for converting office spaces into residential properties in these cities.

Cluster 3: Low Rent Prices and Modest Housing Demand

Cluster 3 comprises cities with a low number of potentially obsolete office spaces per inhabitant. Compared to Cluster 1, the rents are significantly lower, ranging between € 10-14 per square metre. Moreover, the shortage of apartments is manageable, so the conversion of office space into residential properties appears less attractive for investors due to the lower achievable rent levels and the lower shortage of housing.

All considerations do not take into account any funding opportunities for converting office buildings into residential properties.

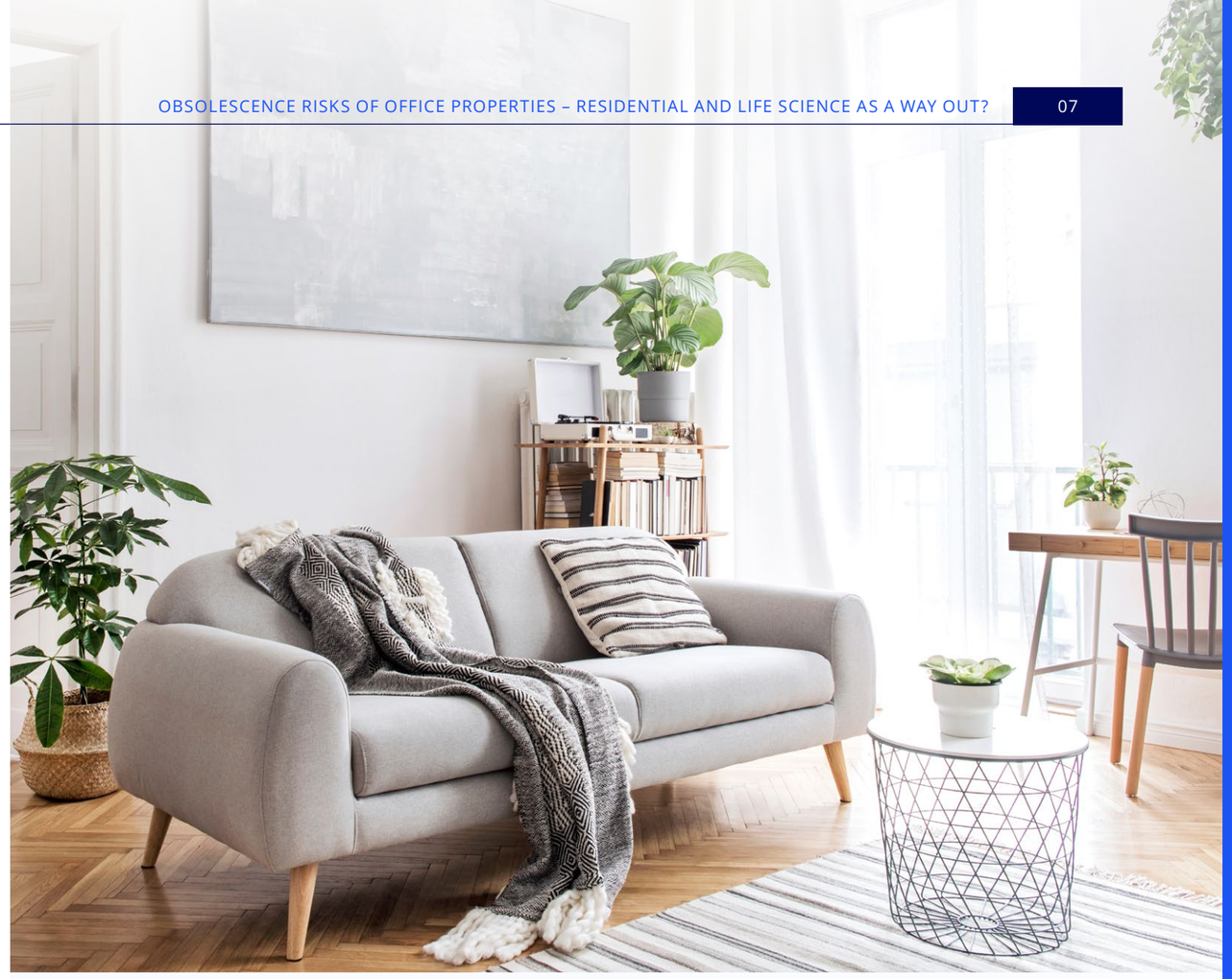
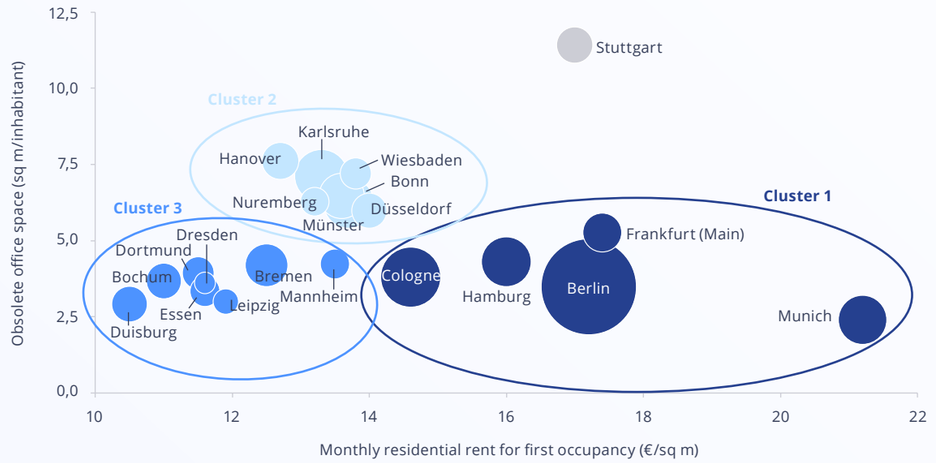


FIGURE 4: SUPPLY OF LIVING SPACE COMPARED TO THE SUPPLY OF POTENTIALLY OBSOLETE OFFICE SPACE (CAPEX SCENARIO: € 5/SQ M/MONTH)



Bubble size: Supply shortage of residential real estate (based on the absolute number of apartments offered per city p.a. per 1,000 inhabitants).

Sources: RIWIS, ImmoScout24, own analysis.

[9] Federal Statistical Office (Destatis), 2024.

[10] Based on data from ImmoScout24.

[11] RIWIS, ImmoScout24, own analyses.

Typological and technical challenges of conversion

Urban patterns and planning approaches for office and residential buildings traditionally differ but have increasingly converged in recent years. For an attractive residential location, social infrastructure and amenities near the building to be converted are essential. Good access to public transport, proximity to schools, nurseries, leisure facilities, as well as green and recreational areas, are crucial factors that enhance the attractiveness of a residential location. Many of these factors are still frequently missing at typical office locations, making successful conversion challenging.

From a building law perspective, the project's approval feasibility is paramount, often posing the greatest hurdle for repurposing. Despite the current strained housing market situation, a precise examination—often on a case-by-case basis—is required to determine whether residential use is even permissible and desired from an urban planning perspective. It is particularly sensible and interesting from a building law perspective when achieving a similar building right to the existing one for a new build seems highly unlikely. An example of this would be older office high-rises, where a new high-rise building permit would probably not be granted after demolition.

By way of example, some important typological and technical aspects that must be taken into account when converting into a residential property should be mentioned:

Building Typology	• **Medium-sized and small office buildings** are generally well-suited in terms of building depth and ceiling heights. • **High flexibility in floor plan design** is advantageous. • **Challenges** often arise **with larger office buildings** with deep building footprints, as special zones such as canteens do not provide sufficient lighting for residential use.
Technical Building Equipment	• Separate electrical and heating circuits and **heating** systems with up to **65 % renewable energy** are required. Implementing such measures can be a significant effort. • The existing technical equipment of the buildings can lead to high operating costs, for example, in the case of an excessive number of elevators for residential use.
Fire Safety	• Residential use involves **increased escape route requirements.** Implementing an appropriate fire protection concept can be particularly costly and complex, especially in buildings with very deep floor plans.
Structural Stability	• **Load-bearing** capacities must be checked as they may have changed over time and, for example, existing **staircases** may no longer meet today's requirements for residential buildings.

Overall, converting office buildings into residential properties requires a careful examination of the location and building law, planning, and technical aspects to ensure that the project is both economically viable and structurally feasible.

According to an analysis by the Urban Planning Office of Frankfurt from 2006, only 22 % of the total office space in Frankfurt is considered suitable for conversion to residential use due to the location quality. The remaining spaces are located on main roads (50 %), other noisy locations (5 %), in industrial areas (9 %), or large agglomerations (13 %).[12]

[12] Urban Planning Office of Frankfurt (2007).

LIFE SCIENCES

The life sciences sector represents a dynamic intersection of various scientific disciplines, whose growth is driven by three fundamental factors:

1. Increasing demand for medical care due to demographic change and an ageing population.
2. Continuous progress in biosciences research and technology, which brings forth innovative therapies and diagnostics.
3. Pharmaceutical companies increasingly rely on outsourcing to enhance efficiency and focus on core competencies and forward-looking research.

Given the intersecting trends of technological innovation and growing demand, the life sciences sector holds extraordinary potential for sustainable growth and represents a future-proof asset class. Key advantages of investing in life science properties include an early-cycle market on the demand side, strong diversification effects from the tenant base, and an above-average rental growth expectation, which is also supported by long-term megatrends. Particularly, a higher rental potential can be cited as an important argument for conversion.

[13] Pitchbook, 2024.
[14] Pitchbook, 2024.

Supply of Life Science Properties

The life sciences sector in Germany is characterised by an undersupply of laboratory space. Due to this strong divergence between supply and demand, attractive opportunities arise for converting office properties into life science properties, despite high costs and technical requirements.

Life science companies typically concentrate in selected locations, often forming clusters shaped by specific sectors. This results in high demand driven by fundamentals that are especially pronounced locally and regionally. A functioning cluster ecosystem usually exists when large companies and small and medium-sized enterprises (SMEs) from various life cycles operate in high concentration in a limited geographic area and share technologies, infrastructure, or capabilities, such as through collaborations with universities.

Successful clusters are also characterised by companies active in the market being additionally financed by venture capital and private equity. Public actors like national ministries, regional authorities, and local communities (e.g., BioRN in the Rhine-Neckar region) promote industrial development, innovation, and technology transfer at these locations. Academic institutions, including universities and research institutes, contribute to cluster development through knowledge transfer and technology development, enabling companies to access a large pool of young professionals with specialised know-how. Examples of major clusters in Germany are Munich-Martinsried and Berlin-Adlershof. In Munich-Martinsried, more than 100 life sciences companies and institutes are located within a small area, including the Ludwig Maximilian University and the Max Planck Institute. The Munich metropolitan area attracted around € 680 million in life sciences-related venture capital in 2023, representing 28 % of the relevant VC volume in Germany and underscoring the importance of this location.[13] In Berlin, this volume was similarly high at 23 %.[14]

Clusters have developed over decades and often historically originated from industrial areas, as shown by the example of Munich-Martinsried. In Germany, these clusters are almost always found outside city centres, where older office buildings are sporadically found between modern buildings developed for the application of cutting-edge technologies. For these properties, repurposing offers significant value enhancement potential, as rents of more than €30 per square metre per month can be achieved and there is a locally concentrated high demand. In Germany, it is evident that such clusters are not necessarily tied to the top 7cities but can also be found outside these cities, depending on the scientific focus (e.g., Heidelberg).

Cluster 1: Low Availability of Potentially Obsolete Spaces, High Rents, and Excellent Cluster Ecosystem

In Berlin and Munich, there is a high demand for life sciences space paired with high expected rents and a strong cluster. Due to the high achievable life sciences rents, these cities are fundamentally attractive for investors from a return perspective. However, it is also evident that in these cities, the volume of potentially obsolete spaces, and thus the supply of convertible office space, is relatively lower.

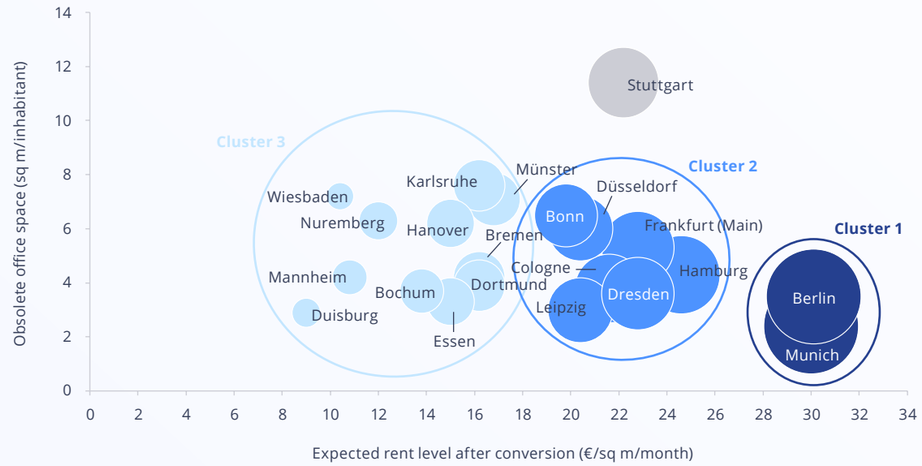
Cluster 2: Moderate Availability of Potentially Obsolete Spaces, Moderate to High Rent Levels, High-Quality Cluster Ecosystem

The cities grouped in Cluster 2 have, on average, a high supply of potentially obsolete spaces per inhabitant compared to the other analysed cities. Stuttgart, in particular, stands out where the volume of potentially obsolete office spaces per inhabitant is significantly higher than in the remaining top 21 cities.

Cluster 3: Low Rent Levels, Relatively Weaker Cluster Ecosystem

Cluster 3 includes cities with lower rent levels and a relatively weaker cluster ecosystem.
Overall, it can be concluded that with low availability of potentially obsolete spaces, coupled with high research density and the availability of skilled labour, the attractiveness of clusters and the expected rent level increases. Converting office properties into life science properties cannot serve as a blanket solution for office vacancies, but especially in established clusters with high research density and supposedly decentralised old office stock, it can represent a very attractive alternative use case for investors.

FIGURE 5: SUPPLY OF LIFE SCIENCE SPACE COMPARED TO SUPPLY OF POTENTIALLY OBSOLETE OFFICE SPACE (CAPEX SCENARIO: €5/SQ M/MONTH)



Bubble size: Space demand, including cluster attractiveness (number of STEM students, VC volume, general macroeconomic outlook, number of semi-public research institutes).

Sources: RIWIS, ImmoScout24, own analysis.

Technical Aspects of Converting to Life Science Properties

The conversion of office spaces into specialised life science properties requires careful planning and consideration of various technical requirements. These requirements pertain to both building regulations and specific structural conditions.

From a regulatory perspective, creating laboratory spaces in commercial and industrial areas is generally permitted. Thus, converting an office property into a life science property is not significantly more difficult from a regulatory standpoint than converting it into a residential property. However, it is necessary to closely examine local building regulations to ensure compliance, especially regarding permits for handling chemicals or other hazardous materials.

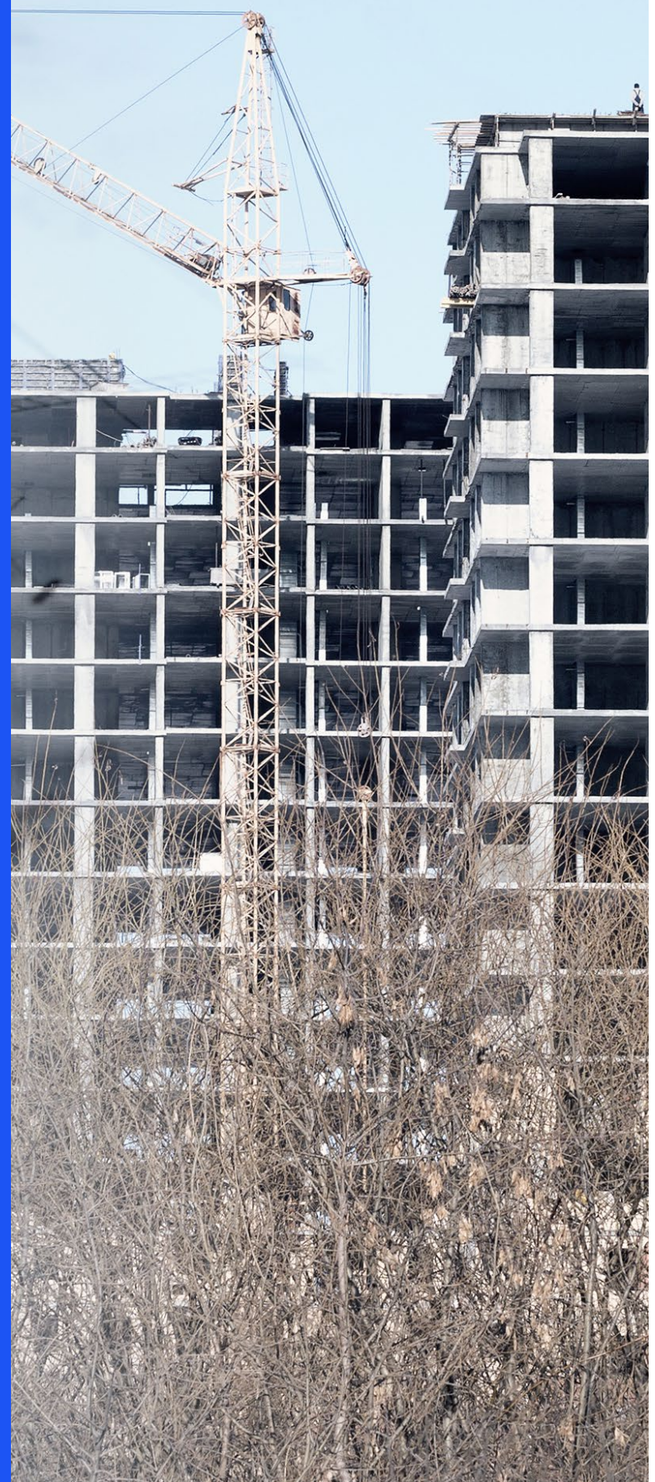
The technical aspects of conversion vary greatly depending on the required safety level of the laboratory, determined by occupational safety frameworks (e.g., EU Directive 2000/54/EC) and the activities of the potential tenant. A "dry lab" requires no special safety measures, while an S1 laboratory poses low risks and requires simple protective measures that, in turn, come with specific technical requirements. S2 laboratories, which have moderate risks, require enhanced safety measures such as special ventilation and access controls. At the safety level of S3 laboratories, the structural requirements are so high that conversions become challenging to realise.

Examples of Important Technical Aspects to Consider When Converting to a Life Science Property:

Floor Height	• **The ideal floor height for laboratory spaces (S1 – S4) is at least 4.3 metres,** allowing for a clear height of at least 3.5 metres from a media supply space of around 0.8 metres. • In certain cases, conversion under 4.3 metres is possible if the clear height is at least 2.75 metres. However, this could restrict usage, for example, if necessary furniture and a ceiling cassette air conditioner are mutually exclusive due to their height profile.
Geometry / Floor Plans / Building Depth	• **Room layout** is based on modules typically used in laboratory operations, **ranging from 3 to 3.5 metres in length.** As these are often placed end-to-end, **room lengths or depths of around 6 to 10 metres** should be achieved.
Floor Loads	• **Floor loads of more than 500 kg per square metre** are required for laboratories. • Special equipment/heavy devices may require **up to 1,000 kg per square metre.**
Vibration	• **Maximum vibration values** of **4,000 MIPS**[15] are desirable for laboratories, especially when microscopes are used. • Values above 4,000 MIPS allow only limited laboratory use.
Technical Systems	• Ventilation and emergency power systems are generally installed on the roof and require ample space. **Emission control regulations** must be observed in this regard.

The conversion of office spaces into life science properties requires comprehensive technical adjustments, ranging from structural reinforcements to specialised HVAC (heating, ventilation, and air conditioning) and safety systems, as well as specific water and wastewater systems. However, the full range of "technical arsenal" is not always necessary, as very often, S1 laboratories are sufficient for most life science tenants.

[15] Unit for measuring ground vibration (MIPS stands for "microinches per second").



4. Potential for Converting Office to Residential and Life Science Properties: Quantitative Approximation

The historical conversion rate of stranded office properties into residential properties in Germany is estimated at between 25 % and 30 %. This figure is inferred from the historical building stock disposal, i.e., the building stock removed from use through demolition, changes in use between residential and non-residential purposes, regulatory measures, or damage cases where no alternative use case exists. A further 50-60 % of the stranded office properties were demolished and rebuilt as residential buildings (20-30 %) or commercial properties (30-35 %); the remaining 10 % were demolished to create open spaces or public transport areas or destroyed in extraordinary events (e.g., fire) and not rebuilt.

Notably, the proportion of conversions has almost continuously increased since 2018, while the proportion of new residential constructions from building stock disposal has steadily decreased. This "spread" between new residential buildings and conversions has reversed since 2018 and now stands at around 10 % in favour of a higher conversion rate versus constructing a new residential building. We attribute this to the declining economic viability of new builds and the increased regulatory requirements **(see Figure 6)**.[16]

[16] Analysis of the "building demolition" of non-residential buildings, recorded by Destatis. Analysis with regard to changes in use between 2015 and 2023. In the German construction industry, "building abandonment" refers to buildings that are withdrawn from use due to damage or demolition or whose use is changed between residential and non-residential purposes.

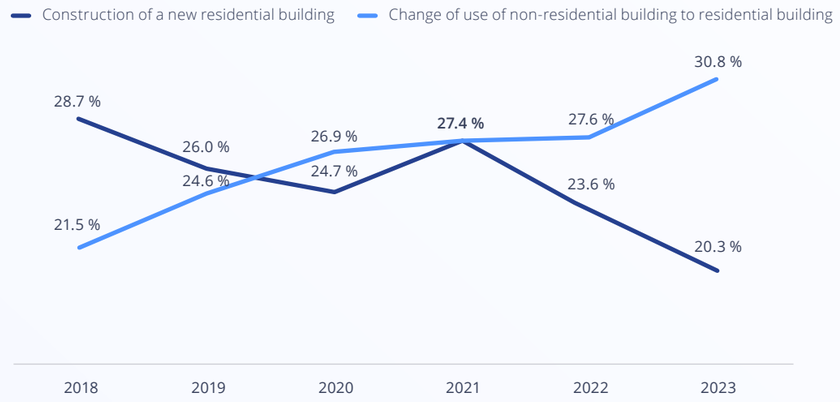
In large cities and metropolitan areas, there is almost a blanket shortage of housing. High demand for housing generally goes hand in hand with higher residential rents at these locations, as has already become very clear from the cluster formation **(Figure 3)**. This fundamentally speaks in favour of conversion from an economic perspective. At the same time, office space remains popular in city locations, and the economic viability of office properties is given, so the number of obsolete office spaces there is generally lower. Due to the lower potential for rent increases, B-cities, particularly city fringe and secondary locations, are more affected by obsolescence. 91 % of the potentially obsolete office spaces are located in city fringe and secondary locations.

Based on building stock disposals, we assume that around 25-30 % of the office space in city locations, city fringe locations, and secondary locations/peripheries in the 21 cities studied can be converted into residential properties. The total area suitable for conversion into residential properties is thus estimated at 15 to 20 million square metres. Repurposing this potentially unused office space offers the possibility of creating 170,000 - 200,000 new homes and saving around 42 million tonnes of CO2 compared to building new homes.[17]

In Germany, life science clusters are often located in city fringe and secondary locations, as these have historically developed in industrial areas outside city centres. Converting office properties in city fringe and secondary locations into life science properties is therefore particularly well-suited to achieving higher economic viability if the office property is located within one of these clusters. However, due to the strong spatial concentration, only a small proportion of these areas is suitable for conversion to life science buildings. We estimate that a maximum of 3-4 % of office space in city fringe and secondary locations/peripheries can be converted into life science properties, resulting in a conversion potential of up to 2.5 million square metres.[18] As the importance of the life sciences industry grows, the convertible proportion of office properties will also increase.

Overall, from a technical and urban planning perspective, we estimate the conversion potential of office properties into residential or life science properties at around 30% of the office space threatened by obsolescence. When considering the economic viability of converting obsolete office spaces, this value could change significantly.

FIGURE 6: DEVELOPMENT OF CONVERSIONS OF NON-RESIDENTIAL BUILDINGS TO RESIDENTIAL BUILDINGS AND NEW RESIDENTIAL BUILDINGS BETWEEN 2018 AND 2023 (IN % OF TOTAL BUILDING STOCK DISPOSAL).



Source: Federal Statistical Office (Destatis) 2024, own analysis.

[17] With emissions of 300 kg CO2 per square metre of living space and around 200,000 homes with an average living space of around 78 square metres.

[18] Assumption based on the share of life science cluster areas in the potential total commercial space of selected cities.

5. Case Study: Economic Model for Repurposing

This report has extensively examined the technical potentials and challenges of repurposing. The central question remains: What rent levels must be achieved, and what market factors must be present for repurposing to be economically attractive for developers, investors, or real estate funds?

The difference in rent levels between existing and repurposed properties, as well as the difference in gross rent multiplier (GRM), are crucial in determining economic viability. These two differences can be quantified as potential added value per square metre or "CapEx potential." When calculating the CapEx potential **(Figure 7)**, a developer margin of 15 % and transaction costs for the purchase and sale of the property have already been considered. Thus, the CapEx potential represents the pure construction cost budget available for repurposing the property.

Our investigation shows that significant differences in rents—such as between office and residential rents—and differences in GRM are necessary to cover repurposing costs, including incidental construction costs ranging from € 2,500 to € 3,500 per square metre. This cost range is considered realistic based on experiences from previous construction projects, depending on the extent of the required construction measures.

Figure 7 illustrates five different examples of converting office properties without considering government subsidies. It becomes clear that the profitability of such conversions largely depends on the initial value of the office properties.

Example A:
An office property in the outskirts of a German city is rented at € 11 per square metre, but the structural vacancy is 50 %. This results in an effective rent of only € 5.50 per square metre across the entire space. Given the attractiveness and high demand in the residential market in this outskirt location, a target rent of € 17 per square metre could be achieved through conversion into a residential property. Even considering a 20 % loss of space during the conversion, this would represent a rent increase of 147 %. With an assumed GRM difference of 12.0x between the current office property (10.0x) and the intended residential use (22.0x), a CapEx potential or construction cost budget of approximately € 2,400 per square metre results after deducting the developer margin and transaction costs.

However, we assess the implementation of this project as unlikely because the rent difference alone is not sufficiently attractive. An additional government subsidy, which is not considered here, could make the project economically viable enough to warrant consideration.

Example E:
An "obsolete office building" with a high structural vacancy potential and low rents in a city fringe location of an A-city, characterised by high housing demand and attractive rent levels, is to be converted. Conversion into serviced apartments appears realistic here, given the favourable transport infrastructure and the city's reluctance to approve a residential use. However, a commercial serviced apartment concept is accepted by the city. Although the assumed loss of space due to an unfavourable layout of the office property is 25 %, the rent difference after conversion is 101 % above the effective office rent. The CapEx potential is already around € 2,868 per square metre with a GRM difference of 7.0x, considering the developer margin and transaction costs.

We consider the likelihood of implementing this project to be high because the high rent difference makes the project economically attractive. Additionally, due to the commercial use, project development can begin promptly, allowing for earlier revenue generation.

FIGURE 7: EXAMPLES OF OFFICE PROPERTY CONVERSIONS

		Stabilized actual rent	structural vacancy	Effective rent	Target rent conversion	Loss of area	Comparative target rent	Rent difference	Current Multiplier	Target Multiplier	CapEx Potential
		€/sq m/month			€/sq m/month	on conversion		"like for like"	on actual rent	on target rent	
Example A	Low office rents with high structural vacancy potential; attractive and sought-after housing market on the outskirts of a major German city; Conversion into housing possible.	11.00	50 %	5.50	17.00	20 %	13.6	147 %	10.00	22.00	2,385
Example B	Low office rents, but with low structural vacancy potential; attractive and sought-after housing market on the outskirts of a major German city; Conversion into housing unlikely.	11.00	0 %	11.00	17.00	20 %	13.6	24 %	10.00	23.00	1,819
Example C	Functioning office building in German B-town with a low purchase price factor with slightly higher apartment rents and factors; Conversion not possible.	15.00	0 %	15.00	17.00	20 %	13.6	-9 %	15.00	23.00	342
Example D	Office building with low rents near a science & tech cluster with conversion potential into 50 % office/50 % life sciences without major loss of space. Conversion possible.	12.00	20 %	9.60	26.00	10 %	23.4	144 %	14.00	19.00	2,867
Example E	"Obsolete office building" with high structural vacancy potential, low rents on the outskirts of an A-city (increased factor) with high demand for housing and attractive rents. Conversion to serviced apartments.	16.00	30 %	11.20	30.00	25 %	22.5	101 %	14.00	21.00	2,868

Loss of land in the context of the conversion is assumed to be 20 %; the developer's assumed margin is approximated at 15 %; usual project duration 1-3 years; i.e. no special building law and thus also time risks; usual transaction costs; CapEx potential includes all ancillary construction costs and BEFORE government subsidies.

Source: Own analysis

Outlook

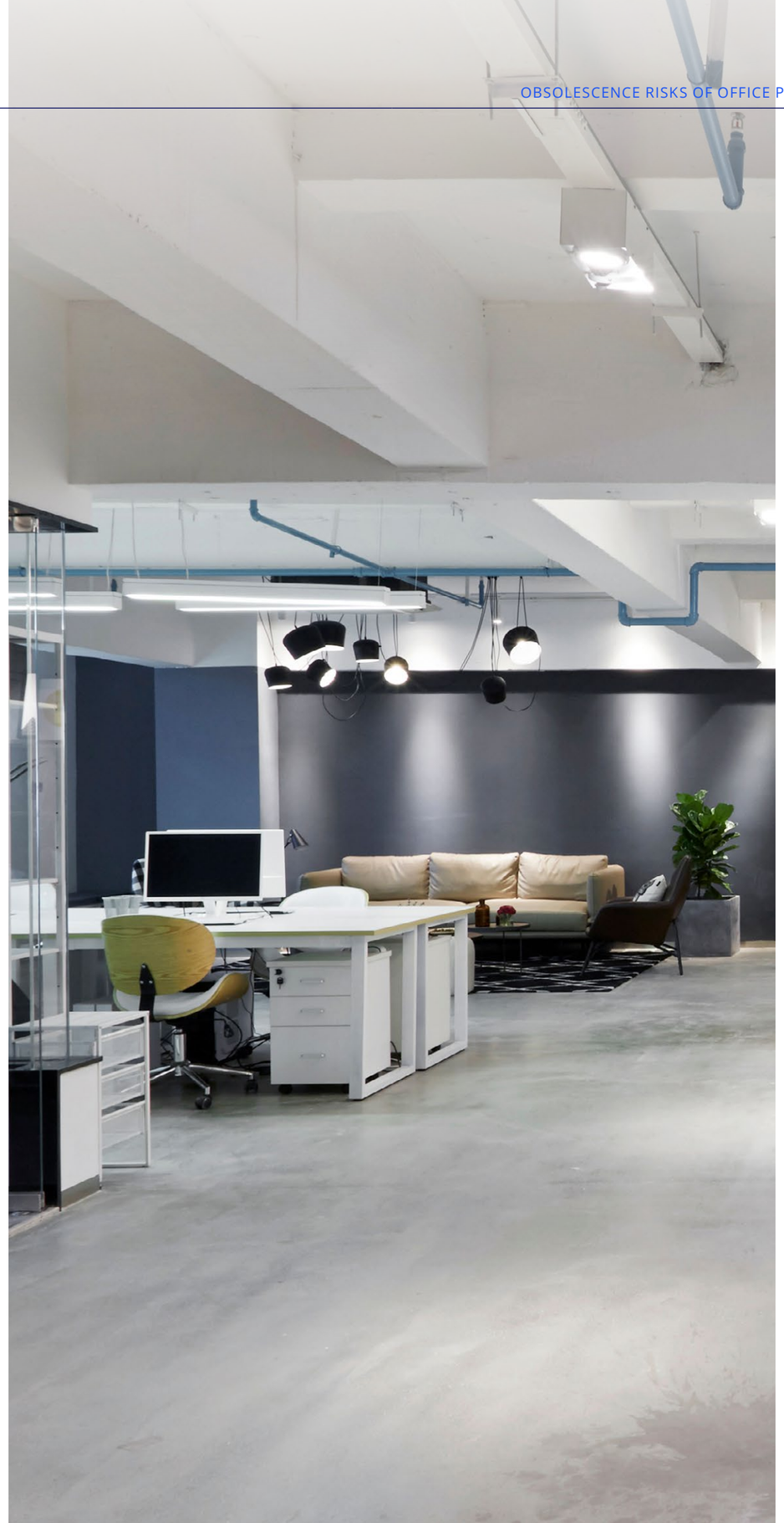
The volume of offices potentially at risk of obsolescence in the coming years significantly exceeds the decline in demand following the adoption of remote working practices. The question of alternative uses for these no longer needed office spaces will therefore continue to gain focus among property owners, investors, developers, and urban planners in the coming years.

This analysis shows that residential and life sciences offer two types of uses that can at least partially serve as alternatives. Repurposing can create urgently needed spaces while simultaneously reducing the stock of no longer required office spaces.

The conversion of office to residential properties could be suitable for 15-20 million square metres of the 75 million square metres potentially threatened by obsolescence, thereby creating 170,000 to 200,000 new homes in the 21 cities studied and saving 42 million tonnes of CO2 compared to new construction. Over time, CO2 savings will gain relevance in the decision-making process between new construction and repurposing, as conversions can reduce CO2 emissions by up to 90 %. Subsidies or CO2-related costs for emissions from new construction projects will further increase the attractiveness of conversions over new construction. Subsidies or the costs of "grey energy" in new construction projects will highlight the advantages of conversions even more clearly in the future.

Conversions of office to residential properties are particularly suitable for the premium segment (luxury apartments) due to the high rents needed for economically viable project development, but not for affordable or social housing. Therefore, converting office space into residential space is not an effective economic solution to the housing crisis. Repurposing office spaces into life science properties is feasible within clusters; however, only a small proportion of the spaces threatened by obsolescence (3-4 %, up to 2.5 million square metres) are suitable for this.

For around 65 % of the office spaces threatened by obsolescence, there is no direct "escape route" into repurposing into residential or life sciences. Alternative types of use, such as grocery retail, educational institutions, or refugee accommodations, could be considered. However, even for these alternatives, the overall potential is likely to be limited.



This situation also affects the institutional investment market. The total capital investments of German institutional investors amount to around € 4 trillion, with property allocation typically ranging between 5 % and 25 %, depending on the investment objective. Assuming a 15 % real estate quota and an average allocation to office properties of 40 %, this results in approximately € 240 billion of national and international exposure to this sector.[19] For the typical investor: A 10 % value correction in the office segment corresponds to a 0.6 % correction at the total portfolio level, which is unlikely to be recovered. A significant risk that must be actively managed.

It should be emphasised that this analysis represents a snapshot of current market conditions. The real estate market is dynamic and will continue to adapt to changing conditions in the future. Rising rents for modern office properties could increase the economic viability of revitalisations and reduce the volume of potentially obsolete office spaces. "Office-to-office" conversions could become an option again for investors and developers in such a case. Continued rent dynamics in the residential sector could also increase the economic viability of conversions, leading to a rising conversion rate. Regulatory and political frameworks also play a crucial role. Subsidies for converting offices to residential use could ensure economic viability and increase the willingness of investors to implement these projects.

[19] Own research, GARBE.

Contact Colliers

Achim Degen
CEO

Cem Ergüney
Head of Office Letting

Andreas Trumpp FRICS
Head of Market
Intelligence & Foresight

Michael Baumann
Head of Capital Markets
Head of Office Invest-
ment B & C Cities

Dominik Fellbaum
Consultant Market
Intelligence & Foresight

Dr. Tobias Dichtl
Co-Head of Market
Intelligence & Foresight

Contact Garbe

Andreas Höfner
Managing Director
Head of Germany

Max Klemke
Senior Investment Manager

Sören Ambrosius
Associate Investment

Harun Attar
Team Lead Hamburg
Senior Investment Manager

Contact PwC

Thorsten Schnieders
Partner Real Estate Deals

Rita Marie Roland
Partner Real Estate Deals

Alexia Manukwem
Senior Manager

Patrizia Altmayr
Senior Associate

Magnus Abels
Associate

colliers.de