

AT A GLANCE

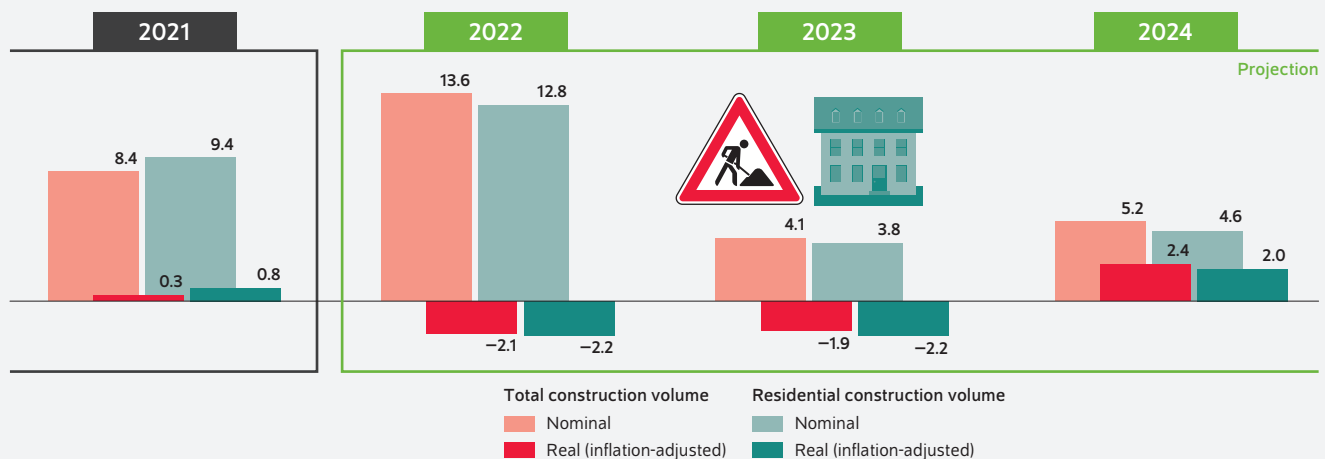
Construction boom coming to an end; change in policy strategy needed

By Martin Gornig and Laura Pagenhardt

- Construction spending increased by nearly 14 percent in 2022; however, the price explosion resulted in a two-percent decrease in real construction volume
- Further significant declines due to rising construction costs and worsening financing conditions are expected for 2023
- Downturn in residential unit construction in particular; German government's targets are thus unattainable
- Construction sector should bounce back in 2024; profitability of construction firms likely to remain satisfactory
- Policymakers must provide incentives for housing construction to increase densification of existing housing stock, for energy-efficient refurbishment, and for investments in municipal infrastructure

Inflation is pushing real construction volume into negative territory – residential construction is developing at a below average pace

Change from previous year in percent



Source: DIW Berlin Construction Volume calculations.

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FROM THE AUTHORS

“Weak growth in residential construction is making the German government’s goal of building 400,000 new apartments a distant prospect. However, policymakers should focus less on the total number of new housing units and more on creating housing in the lower price segment in metropolitan areas.”

— Martin Gornig —

MEDIA



Audio Interview with Laura Pagenhardt (in German)
www.diw.de/mediathek

Construction boom coming to an end; change in policy strategy needed

By Martin Gornig and Laura Pagenhardt

ABSTRACT

Following the construction boom of recent years in Germany, inflation and supply bottlenecks hit the industry hard in 2022. While nominal construction volume increased by nearly 14 percent, it decreased by two percent when adjusted for inflation. Residential construction, which is urgently needed, was particularly affected. In 2023 and 2024, it is expected that investors will show restraint and that nominal construction volume will only grow by four to five percent due to rising construction costs and worsening financing conditions. However, the core construction industry should also benefit from the upturn in construction activity, particularly in commercial and public sector construction. The decrease in real construction volume is putting policymakers under enormous pressure and requires a strategy change. Key policy goals can only be achieved if construction capacities are significantly expanded, not shrunk. Policy should focus in particular on incentives for the redensification of existing buildings, for energy-efficient refurbishment, and for expanding municipal infrastructure.

The German construction industry faced major problems in 2022, many of which are likely to have a noticeable impact in 2023. Inflation and the loss of purchasing power, supply bottlenecks, the energy crisis, and economic downturns resulted in exploding construction prices and a drop in new orders. Although the rise in prices is causing construction companies' nominal sales to rise, real construction volumes are likely to decline in 2022 and 2023 according to DIW Berlin calculations.¹

Price increases will likely slow somewhat in 2023 due to the easing of supply chain bottlenecks and material prices as well as decreasing capacity utilization. Nevertheless, the upward price trend will remain strong and, coupled with rising interest rates and economic uncertainty, will likely slow construction activity. As a part of the economic recovery, real construction volumes are also likely to expand again in 2024.

These are the results of DIW Berlin's calculations of the construction volume,² which includes investment in construction as well as repairs that do not increase value. Furthermore, in addition to construction in the narrower sense, the calculations encompass related sectors, such as steel and light metal construction, the manufacture of prefabricated buildings, building fittings, planning, and other services. As a supplement to the investment calculation of the Statistical Offices, DIW Berlin differentiates between new housing construction activity and housing stock modernization.³

DIW Berlin not only calculates and documents the construction volume of past years; it also forecasts corresponding values for the current (2023) and subsequent years (2024).

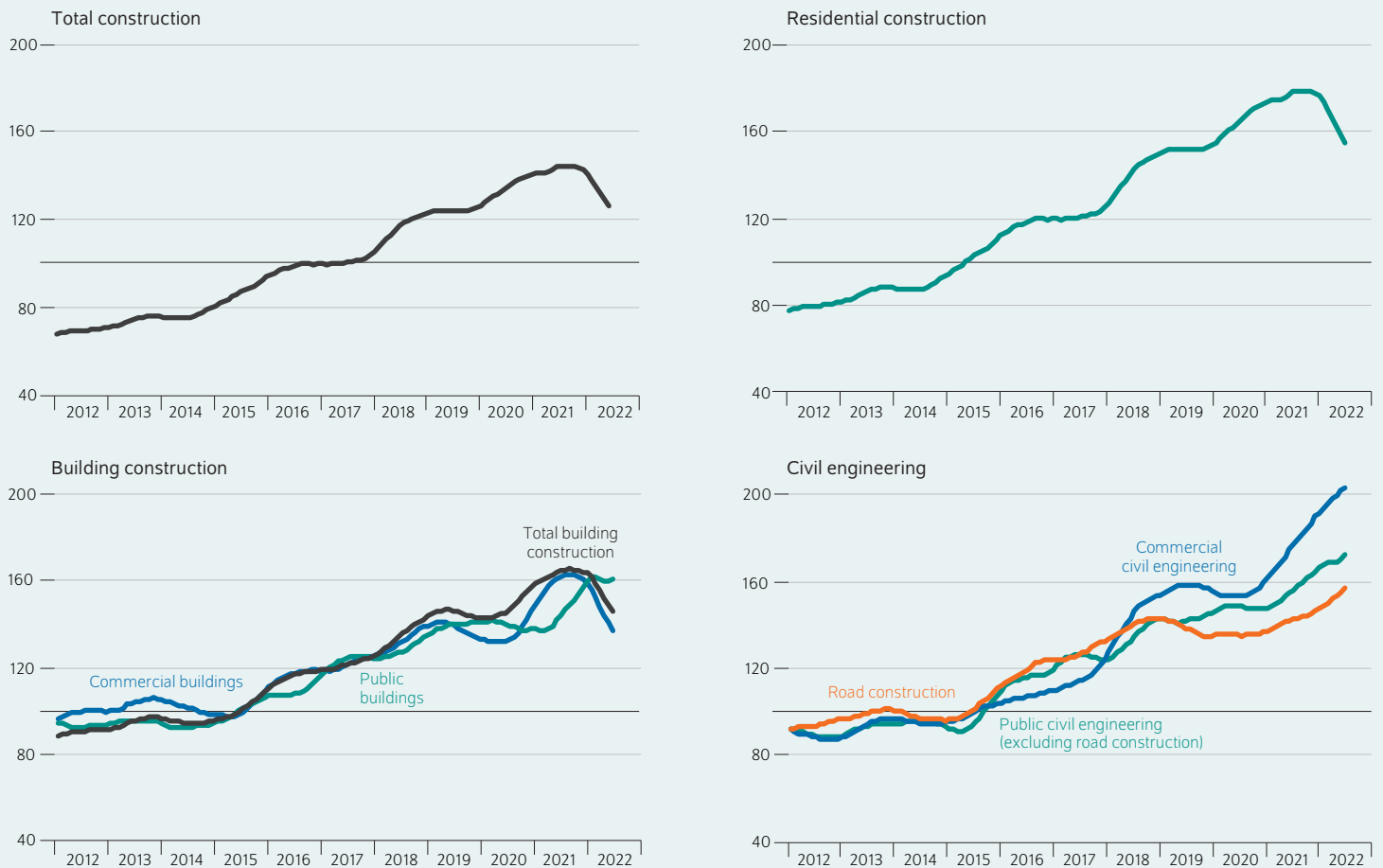
¹ Assumptions on construction price development are based on the Fall 2022 Joint Economic Forecast (in German; available online, accessed on January 3, 2023) and the authors' calculations. Forecasts are adjusted for each sector.

² The construction volume calculation is financed with funds from the *Zukunft Bau* research initiative of the Federal Ministry for Housing, Urban Development and Building (*Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen*, BMWSB). Also see the definition of *Bauvolumen* in the DIW Glossary (in German; available online, accessed on December 22, 2022). This applies to all other online sources in this report unless stated otherwise.

³ Martin Gornig, Claus Michelsen, and Hanna Révész, "Strukturdaten zur Produktion und Beschäftigung im Baugewerbe – Berechnungen für das Jahr 2020," BBSR-Online-Publikationen, no. 32 (2021) (in German; available online).

Figure 1

New orders in the core construction industry
Index 2015 = 100, current prices, trend component



Source: Federal Statistical Office.

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There is a clear downward trend in new orders, particularly in building construction and especially in residential construction.

This forecast (Box) is integrated into DIW Berlin’s Economic Outlook, particularly with regard to investment activity. In addition to the present estimates regarding the development of construction investment, the construction volume calculation includes forecasts on the growth of new and existing construction volumes in the building, residential, and non-residential construction sectors.⁴ In addition, these figures are used to derive the development trends of the core construction industry and the renovation sector.

Major problems in residential construction

The situation for the residential construction sector was difficult in 2022. Above all, the dynamic increase in prices, which began as early as 2021 due to supply bottlenecks and

material shortages and intensified with the energy crisis in 2022 (construction prices are expected to have risen by a good 15 percent in 2022), took its toll on investments in residential construction. The massive loss of purchasing power as a result of the sharp rise in consumer prices and uncertainty about future real income trends resulted in many households being reluctant to invest in housing. For example, there were marked declines in new orders (Figure 1), primarily in the second half of 2022. Furthermore, according to an ifo Institut survey, nearly 17 percent of construction companies complained about cancellations.⁵ This means that the upward trend in the order backlog, which had been observed since 2016 in particular, has come to a halt for the time being and has likely passed its peak (Figure 2).

⁴ Cf. Claus Michelsen and Martin Gornig, "Prognose der Bestandsmaßnahmen und Neubauleistungen im Wohnungsbau und im Nichtwohnungsbau," *BBSR-Online-Publikation 7* (2016) (in German; available online).

⁵ ifo Institut, "Stornierungen im Wohnungsbau nehmen wieder zu," press release from December 12, 2022 (in German; available online).

Box

Method for forecasting construction volume

Indicator-based statistical models are used to forecast the construction volume. The forecasting variable, for example residential construction volume, is regressed on an autoregressive term and on concurrent as well as lagged values of the respective indicator, for example new orders. The construction volumes of new and existing buildings are estimated separately.

The forecast equation is as follows:

$$y_t = \alpha + \sum_{j=1}^n \beta_j y_{t-j} + \sum_{j=1}^m \gamma_j x_{t-j} + \varepsilon_t$$

y_t stands for the value to be forecast, x_t for the indicator, and ε_t for the statistical error term. α , β_n and γ_j are the estimated parameters. The numbers of lags n and m (years) are determined based on the autocorrelation or cross-correlation function. The approach of estimating a large number of individual models and using average values for the forecast has proved effective. For an individual series, up to 1,500 single models are estimated. Construction permits, new orders and the order backlog, production, interest, loan volumes, employment and income trends, and surveys of construction companies and freelance architects have proven to be suitable indicators.¹

Using this approach, a forecast with a prediction capability of up to two years can be made for all aggregates. It should be noted, however, that the number of point estimates used for averaging decreases significantly as the forecast range increases due to the different prediction capabilities of the individual indicators. To provide the forecast with additional stability, expectations for employment and GDP for 2022 to 2024 are therefore also included in the models as concurrent indicators. Expected civil engineering work is equal to the difference between total volume and construction volume.

The construction volume forecast for the previous year (2022) is also calculated using this method (nowcast). The indicators are updated using statistical methods to obtain values for 2022. All model results are rationalized using the construction investment forecast. Assumptions about the development of construction prices are based on the Autumn 2022 Joint Economic Forecast² and the authors' calculations. Price forecasts are adjusted for each sector.

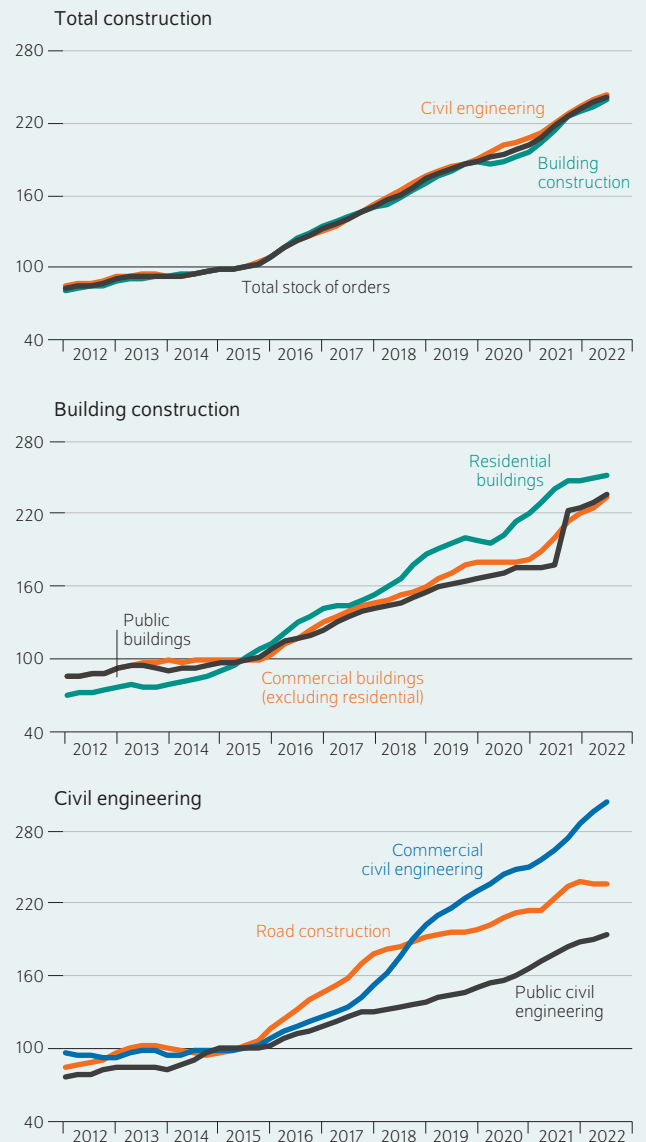
¹ Cf. Claus Michelsen and Martin Gornig, "Prognose der Bestandsmaßnahmen und Neubauleistungen im Wohnungsbau und im Nichtwohnungsbau," *BBSR-Online-Publikation 7* (2016) (in German; available online).

² ifo Institute, Joint Economic Forecast Autumn 2022: Energy Crisis: Inflation, Recession, Welfare Loss (2022) (available online).

However, rising costs are not the only culprit. The European Central Bank's interest rate turnaround has tightened financing conditions even more: Over the course of 2022, the

Figure 2

Stock of orders in the core construction industry
Index 2015 = 100, current prices, trend component



Source: Federal Statistical Office.

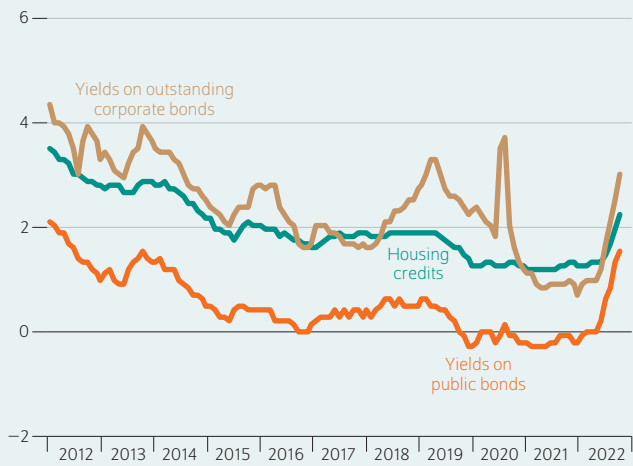
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Since 2022, order books have been filling up more slowly, especially in the structural engineering sector.

interest rates for housing loans increased from 1.3 to over three percent and are now at the 2013-level (Figure 3). For private households in particular, which account for the bulk of residential construction volume, this is likely to be a key obstacle, thus further dampening construction demand.

At the same time, housing demand remains high and the need has become even more acute with the influx of Ukrainian refugees over the course of 2022: From February to November, more than one million refugees from Ukraine were registered in the German Central Register of

Figure 3
Interest rates and yields
In percent, monthly average



Source: Deutsche Bundesbank.

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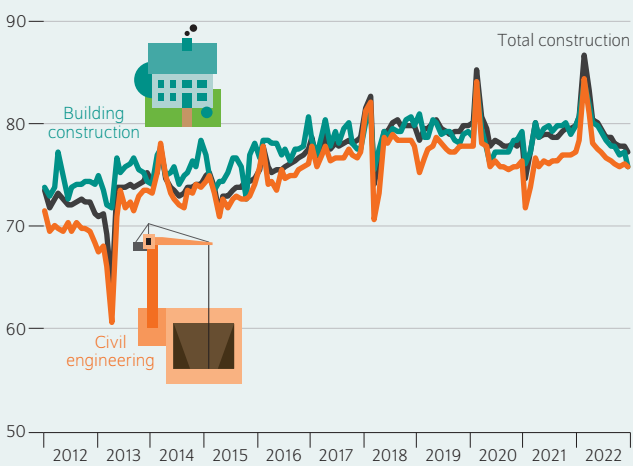
Interest rates increased significantly in 2022.

additional housing required depends on how long the refugees stay in Germany, which cannot be predicted with certainty. Past experiences with refugees, such as during the Western Balkans conflict, have shown that some people do return to their home countries once it has become safe to do so. Others, however, may permanently settle in Germany and bring their relatives over.⁷ This increases the demand for already scarce housing.

In light of decreasing capacity utilization in the construction sector (Figure 4) and the slight easing on the materials markets—prices for lumber and steel have recently declined—the price trend is likely to calm somewhat in 2023.⁸ According to *ifo* surveys, the share of construction companies complaining about material shortages fell markedly at the end of 2022 and less enterprises expect prices to rise at the beginning of the new year. Nevertheless, capacity utilization remains high by historical standards and price momentum is strong overall. Thus, the difference between nominal and real sales figures is likely to remain significant in 2023.

Overall, following an increase of 12.8 percent in 2022, nominal residential construction volume is expected to increase by 3.8 percent in 2023 and by around 4.6 percent in 2024 (Table 1). However, these increases will be canceled out by the rise in construction prices, resulting in real declines of a good two percent for both 2022 and 2023. For 2024, however, real growth of two percent is expected.

Figure 4
Capacity utilization in the construction sector
As a percentage of normal seasonal machine utilization



Source: ifo Institute.

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Following bottlenecks in 2021, capacity utilization dropped significantly in 2022.

New residential unit construction weakens the most

The problems in residential construction were mainly reflected in new construction. There, the change in the interest rate environment is likely to play a decisive role and to dissuade at least some households from undertaking new construction projects. For example, building permits have followed a marked downward trend since the *Baukindergeld* (a subsidy granted per child to help families purchase homes) ended in March 2022 and primarily during the second half of 2022 (Figure 5). This is likely to have a significant impact on new construction activity in 2023, which is expected to rise significantly less in nominal terms than in 2022 despite the dynamic increase in prices, especially when current construction projects are completed and fewer new projects are initiated. With less uncertainty and the economic environment normalizing, investment behavior should be less restrained in 2024.

To counteract the acute slump and create investment incentives, the German government recently passed the Annual Tax Act 2022, which includes tax incentives for housing

Foreigners.⁶ Metropolitan areas in particular are struggling with a lack of available housing. The final amount of

⁶ Cf. the website of the information platform *Mediendienst Integration*, which uses figures from the Federal Ministry of the Interior and Community.

⁷ According to a recent survey, 26 percent of Ukrainian refugees want to stay in Germany permanently and 13 percent want to stay for a longer period of time, cf. DIW Berlin, IAB, BIB, and BAMG, "Ukrainische Geflüchtete bringen gute Voraussetzungen für die Teilhabe in Deutschland mit," press release from December 15, 2022 (in German; available online).

⁸ Carsten-Patrick Meier, Finn Dumoulin, and Christopher Dahl, "Mittelfristprognose der Preise für Bauleistungen," *BBSR-Online-Publikation 10* (2021) (in German; available online).

CONSTRUCTION VOLUME CALCULATION

Table 1

Residential construction volume in Germany

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2016	2017	2018	2019	2020	2021	2022	2023	2024	
	In billion euros at the respective year's prices										Change from the previous year in percent									
New construction volume ¹	56.5	62.8	67.2	71.7	75.4	79.2	85.9	95.3	97.9	103.2	11.3	7.1	6.6	5.1	5.0	8.5	10.9	2.7	5.5	
Construction on existing buildings ²	131.3	136.3	143.2	153.1	165.5	173.5	190.4	216.5	225.7	235.4	3.8	5.0	6.9	8.1	4.8	9.7	13.7	4.2	4.3	
Total residential construction volume	187.8	199.1	210.4	224.8	240.9	252.7	276.4	311.8	323.6	338.6	6.1	5.7	6.8	7.2	4.9	9.4	12.8	3.8	4.6	
	Shares in percent																			
New construction volume ¹	30.1	31.5	32.0	31.9	31.3	31.3	31.1	30.6	30.2	30.5										
Construction on existing buildings ²	69.9	68.5	68.0	68.1	68.7	68.7	68.9	69.4	69.8	69.5										
Total residential construction volume	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0										
	Index 2015 = 100																			
Price development	100.0	102.1	105.4	110.3	115.2	117.3	127.4	146.9	155.9	159.9	2.1	3.3	4.6	4.5	1.8	8.6	15.3	6.2	2.6	
	Real, chain index 2015 = 100																			
New construction volume ¹	100.0	109.2	113.3	115.6	116.4	120.1	120.1	114.7	110.8	114.0	9.2	3.8	2.0	0.7	3.2	0.0	-4.5	-3.4	2.9	
Construction on existing buildings ²	100.0	101.7	103.5	105.9	109.8	113.1	114.4	112.6	110.4	112.3	1.7	1.7	2.4	3.6	3.0	1.2	-1.6	-1.9	1.7	
Total residential construction volume	100.0	104.0	106.5	108.9	111.8	115.2	116.1	113.6	111.1	113.3	4.0	2.4	2.3	2.7	3.1	0.8	-2.2	-2.2	2.0	

1 Estimated using the estimated construction costs (construction activity statistics), plus surcharges for architects' services and fees, exterior facilities, and internal activities of investors.

2 Buildings and housing modernization (incl. conversion and extension measures) as well as repair services in the construction industry.

Sources: Federal Statistical Office; DIW Construction Volume calculations.

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Table 2

Non-residential construction volume in Germany

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2016	2017	2018	2019	2020	2021	2022	2023	2024	
	In billion euros at the respective year's prices										Change from the previous year in percent									
New construction volume ¹	31.9	35.3	38.1	41.7	45.0	46.8	50.0	56.9	58.7	62.4	10.7	8.0	9.3	8.0	4.0	6.8	13.8	3.1	6.3	
Construction on existing buildings ²	58.0	56.5	57.8	59.7	60.8	61.4	65.7	76.0	80.8	85.2	-2.6	2.4	3.3	1.9	0.9	7.0	15.7	6.3	5.4	
Total non-residential construction volume ³	89.9	91.8	95.9	101.4	105.8	108.2	115.7	132.9	139.5	147.6	2.1	4.5	5.7	4.4	2.2	6.9	14.9	4.9	5.8	
	Shares in percent																			
New construction volume ¹	35.5	38.5	39.7	41.1	42.5	43.3	43.2	42.8	42.1	42.3										
Construction on existing buildings ²	64.5	61.5	60.3	58.9	57.5	56.7	56.8	57.2	57.9	57.7										
Total non-residential construction volume ³	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0										
	Index 2015 = 100																			
Price development	100.0	101.9	105.6	110.5	114.6	116.9	126.6	147.7	157.4	162.3	1.9	3.7	4.6	3.7	2.0	8.4	16.7	6.6	3.1	
	Real, chain index 2015 = 100																			
New construction volume ¹	100.0	108.8	113.5	118.9	124.0	126.5	124.5	121.0	116.8	120.6	8.8	4.4	4.7	4.3	2.0	-1.5	-2.8	-3.5	3.2	
Construction on existing buildings ²	100.0	95.5	94.3	93.0	91.3	90.4	89.1	88.3	88.1	90.1	-4.5	-1.3	-1.3	-1.9	-1.0	-1.4	-1.0	-0.2	2.3	
Total non-residential construction volume ³	100.0	100.2	101.1	102.1	102.8	103.0	101.7	99.8	98.6	101.2	0.2	0.9	1.0	0.6	0.3	-1.3	-1.9	-1.2	2.6	

1 Including agricultural buildings.

2 Including other non-agricultural buildings.

3 Construction volume in commercial and public building construction.

Sources: Federal Statistical Office; DIW Construction Volume calculations.

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investments and came into force on January 1, 2023, half a year earlier than planned. First, the allowance for depreciation (*Absetzung für Abnutzung, AfA*) was increased from two to three percent, which is likely to stimulate new construction activity in the medium term across the board.

Second, a time-limited additive special tax deduction for newly built rental housing was introduced. This depreciation

allows five percent of the construction costs for newly built rental housing to be deducted within four years if they meet certain climate protection requirements (*KfW40*). Consequently, starting in 2023, investors may write off up to 32 percent on new buildings over four years.⁹ However,

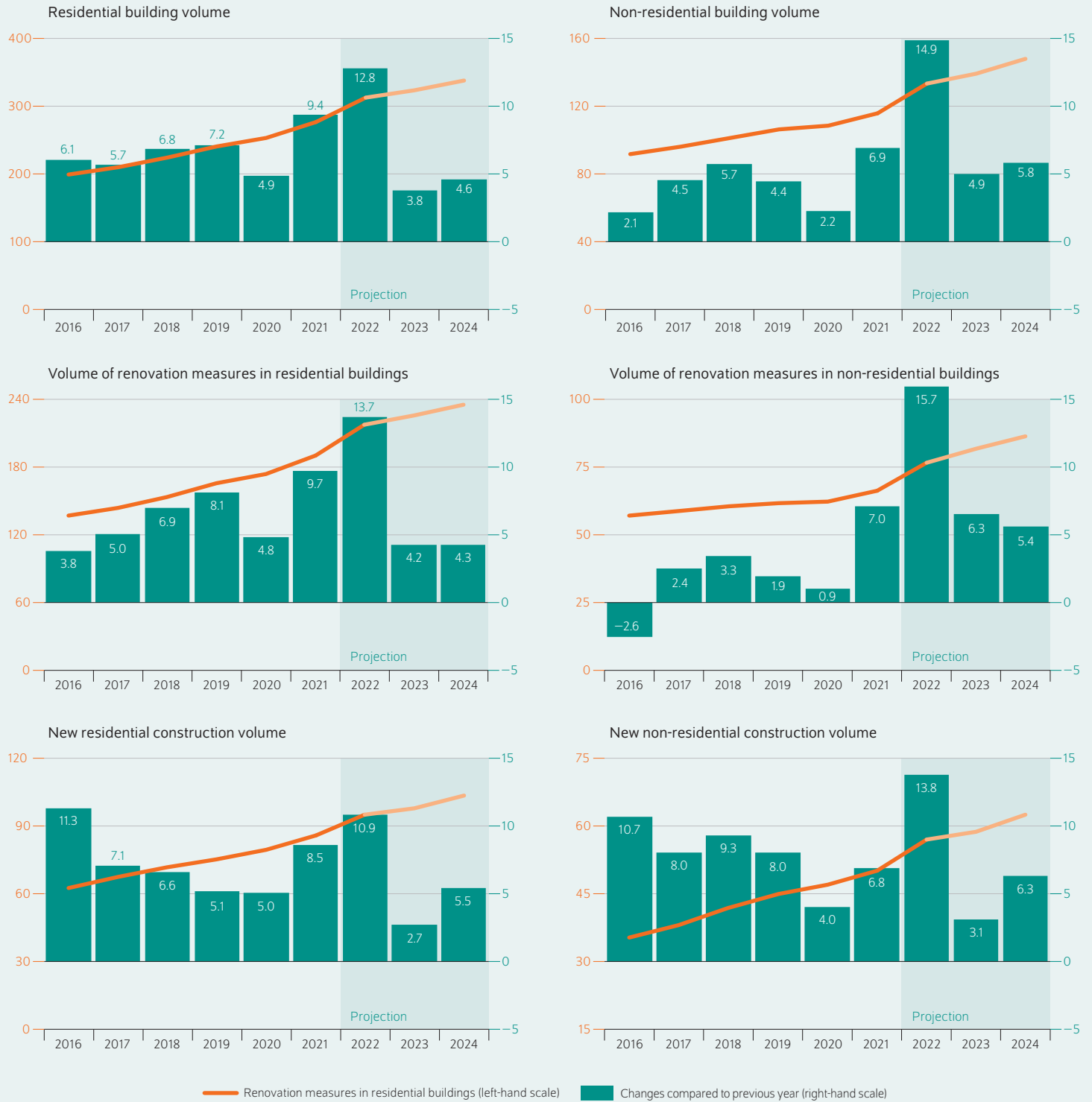
⁹ Cf. Deutscher Bundestag, *Beschlussempfehlung und Bericht des Finanzausschusses zum Entwurf eines Jahressteuergesetz 2022 (2022)* (in German; available online).

CONSTRUCTION VOLUME CALCULATION

Figure 5

New and existing building construction in Germany

In billions of euros in current prices (left-hand axis), change from previous year in percent



Source: DIW Berlin Construction Volume calculations.

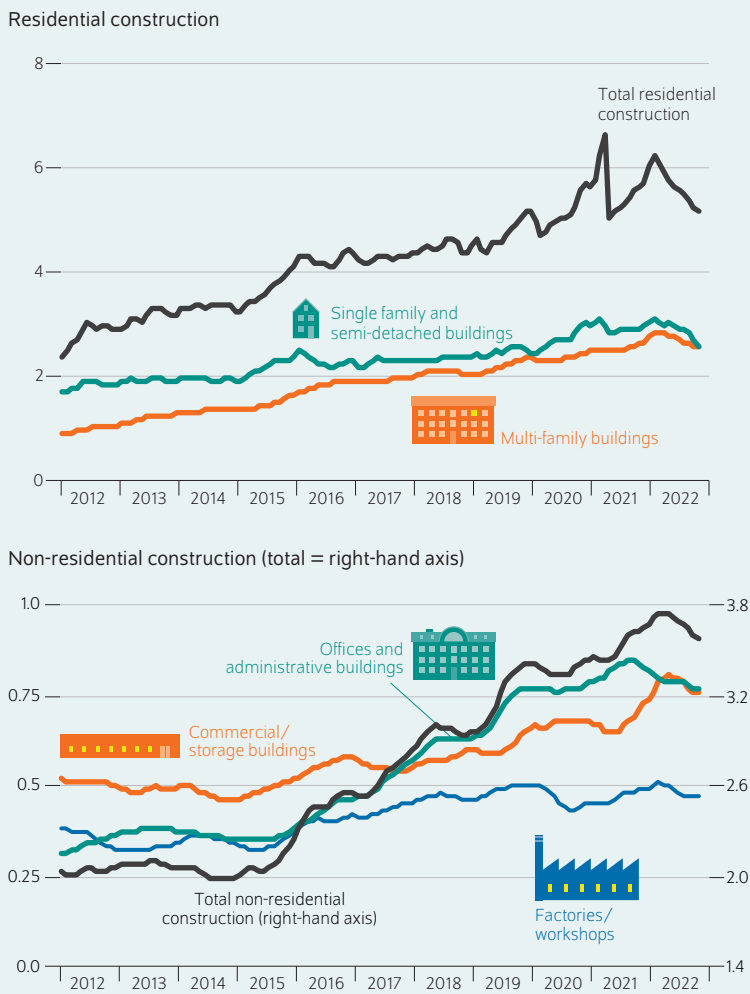
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While nominal volume increased significantly in 2022, growth is likely to be considerably weaker in 2023 and 2024.

Figure 6

Building permits in building construction in Germany

Current prices in billion euros, trend component



Source: Federal Statistical Office.

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The total value of newly approved buildings declined notably in 2022.

the broad impact is likely to remain limited due to the strict requirements. Furthermore, the German government is planning to renew funding for new housing construction beginning in March 2023. These conditions are likely to at least partially support residential unit construction and thus prevent an even stronger slump.

Nevertheless, new residential unit construction is likely to weaken over the coming years: In 2022, the nominal 11-percent increase was completely canceled out by price increases, resulting in a price-adjusted decline of 4.5 percent. In 2023, growth is expected to only be at 2.7 percent, equivalent to a real decline of 3.4 percent. In 2024, nominal growth is likely to increase to 5.5 percent, and, assuming weaker price development, real growth should then return to 2.9 percent.

Renovation and modernization having a stabilizing effect

In 2020 and 2021 during the coronavirus pandemic, renovation work was especially affected by material shortages and lockdown measures and experienced the strongest decline; currently, it is having a stabilizing effect on construction activity. This is, for example, indicated by the renovation sector's construction output, which, in contrast to the core construction industry, is steady at a low but constant level, thus stabilizing construction output overall (Figure 6). Some expansion and renovation projects have likely been cut back or even canceled completely due to higher costs; after all, such projects can be adjusted more quickly and easily to meet changing budget restrictions than new construction projects. At the same time, however, the decline in new construction is likely to make more builders available for renovation and modernization projects, which in turn will make the projects more feasible.

Surveys of housing companies indicate this shift. For example, in light of rising construction prices, 24 percent of responding companies said they would forgo new construction projects, but only eight percent were considering forgoing modernization projects.¹⁰ In addition, the number of permits issued for construction work on existing buildings pointed to lower restrictions on modernization. While approved construction costs for modernization were still above the 2021 level up to October 2022, they have since fallen significantly for new construction (Figure 7).

Energy-related renovations have also been a significant motivator for housing modernization for years. With skyrocketing energy prices and the prospect of them remaining high in the long term, incentives to invest in energy-related renovation have increased once again. The subsidy programs for energy-efficient building refurbishment are likely to have a correspondingly growing impact, especially as the total subsidy amount of just under 13 billion euros in 2022 was significantly higher than the roughly eight billion euros in 2021. For 2023, it is to be increased to up to 16 billion euros. However, the Federal Ministry for Economic Affairs and Climate Action has not yet announced any concrete decisions.

Thus, work on existing buildings is likely to expand more than new construction work in nominal terms in 2023. Following growth of 13.7 percent (real: -1.6 percent) in 2022, renovation work is expected to increase by a good four percent in 2023 and 2024. Price-adjusted, this results in a 1.9-percent decline and 1.7 percent growth, respectively.

Non-residential construction still dealing with economic uncertainty

The effects of price increases are also affecting non-residential construction, albeit less significantly than residential

¹⁰ Bundesverband deutscher Wohnungs- und Immobilienunternehmen (GdW), *Wohnungs-wirtschaftliche Daten und Trends 2022/2023* (2022) (in German).

construction. The stock of orders continued to grow and, accordingly, remains at record level (Figure 8). This growth was primarily driven by the public sector, whose new orders have been rising until recently. In contrast, commercial building construction weakened (Figure 9). In light of the very uncertain economic situation and the strong increase in factor costs, many companies are forgoing investments in new plants and warehouses. In addition, interest rate hikes make borrowing for major construction projects less attractive.

Increases in nominal spending on non-residential construction of 4.9 percent (real: -1.2 percent) and of 5.8 percent (-2.6 percent) in 2023 and 2024, respectively, are expected, following a nominal increase of 14.9 percent (-1.9 percent) in 2022.

Economic slowdown curbing construction of new non-residential buildings

Following the peak of the coronavirus pandemic and the end of lockdown measures, commercial building construction grew robustly in 2021. The revival of retail stimulated investments in new warehouse buildings, while the widespread return to the office encouraged planning and construction of office buildings. Demand for factory buildings also increased (Figure 5). The economic downturn triggered by the Ukraine war and the energy crisis has now put a stop to this development. In downturn phases, investments in new buildings usually do not make sense for companies and are thus postponed. This restraint is likely to continue in 2023, slowing down the new construction volume. However, this trend is likely to reverse as the economy recovers at the end of 2023 and especially in 2024.

Public construction plans are likely to specifically suffer due to the price increases. Although many funds have been invested in recent years, public and private budgets are planned in nominal terms and can only react to price increases to a limited extent, especially in the short term. This is likely to hinder real construction investments. Moreover, higher spending on energy burdens municipal budgets. Compensation for the increased construction prices by respective budget increases in the short term seems unlikely in many places.

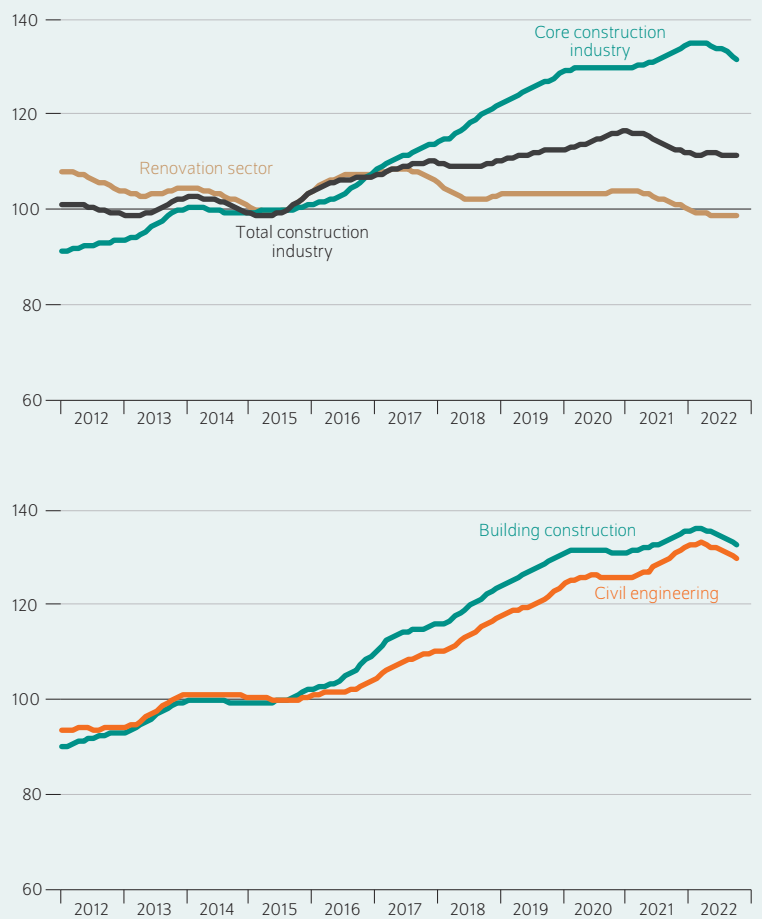
Following growth of 13.8 (real: -2.8) percent in 2022, new construction activity in non-residential buildings is likely to experience growth of 3.1 percent in 2023. In 2024, the nominal increase is projected to be 6.3 percent. Price-adjusted, the new construction volume is expected to decline by 3.5 percent in 2023 and then grow again by 3.2 percent in 2024.

Renovation and modernization becoming more profitable

Renovations of existing buildings are likely to continue growing in importance in the future, as incentives for energy-efficient refurbishment will become stronger in light of rising energy costs and new buildings will become less attractive

Figure 7

Production in the construction industry
Index 2015 = 100, constant prices, trend component



Source: Federal Statistical Office.

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The renovation sector can somewhat offset the slump in the core construction industry.

in comparison due to rising construction and land prices.¹¹ The current uncertain economic situation is also likely to be a factor in many investors shifting their investments away from new construction and towards renovation, especially in 2023. The large refurbishment backlog is further continuing to put pressure on the public sector. Investment requirements have been piling up for years, especially in municipal building stock.¹²

Following nominal growth of 15.7 percent in 2022, renovation and modernization is likely to grow by 6.3 and 5.4 percent in 2023 and 2024, respectively. However, here too, the real figure is lower due to price increases. Following a decline of

¹¹ Konstantin Kholodilin and Malte Rieth, "Immobilienmarkt bisher stabil – aber Risiko für Preiskorrekturen hat zugenommen," *DIW Wochenbericht*, no. 47 (2022) (in German; available online).

¹² Christian Raffer and Hendrik Scheller, *KfW-Kommunalpanel 2022 (2022)* (in German; available online).

CONSTRUCTION VOLUME CALCULATION

Table 3

Civil engineering in Germany

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2016	2017	2018	2019	2020	2021	2022	2023	2024
	In billion euros at the respective year's prices										Change from the previous year in percent								
Commercial civil engineering	30.3	32.9	35.0	37.2	39.2	43.3	49.4	51.8	55.3	2.5	8.6	6.4	6.1	5.6	10.3	14.3	4.8	6.7	5.5
Public civil engineering	28.5	30.9	34.4	36.5	37.7	39.4	45.5	47.9	50.2	4.2	8.4	11.5	6.0	3.2	4.6	15.5	5.1	4.8	4.3
Total civil engineering	58.8	63.8	69.5	73.7	76.9	82.7	95.0	99.7	105.4	3.3	8.5	8.9	6.1	4.4	7.5	14.9	4.9	5.8	4.6
	Shares in percent																		
Commercial civil engineering	51.9	51.5	51.6	50.4	50.5	51.0	52.3	52.1	52.0	52.4									
Public civil engineering	48.1	48.5	48.4	49.6	49.5	49.0	47.7	47.9	48.0	47.6									
Total civil engineering	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0									
	Index 2015 = 100																		
Price development ¹	100.0	101.58	106.25	113.00	118.20	119.94	127.54	148.78	158.54	163.49	1.6	4.6	6.4	4.6	1.5	6.3	16.7	6.6	3.1
	Real, chain index 2015 = 100																		
Commercial civil engineering	100.0	101.1	105.2	105.7	108.1	112.0	115.6	112.2	110.2	114.1	1.1	4.0	0.4	2.3	3.6	3.2	-2.9	-1.8	3.5
Public civil engineering	100.0	102.4	106.3	111.3	112.0	114.5	113.5	113.6	111.9	114.0	2.4	3.8	4.8	0.6	2.3	-0.9	0.1	-1.5	1.9
Total civil engineering	100.0	101.8	105.7	108.4	110.0	113.2	114.5	112.5	110.7	113.6	1.8	3.9	2.5	1.4	2.9	1.2	-1.8	-1.6	2.7

1 As no detailed information on price developments in civil engineering is available, the same price changes are assumed for civil engineering and non-residential building construction. In addition, sector-specific price assumptions apply to commercial and public civil engineering (not shown).

Sources: Federal Statistical Office; DIW Construction Volume calculations.

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Table 4

Key figures for the development of construction volume in Germany

	2017	2018	2019	2020	2021	2022	2023	2024	2018	2019	2020	2021	2022	2023	2024	
	In billion euros at the respective year's prices								Change from the previous year in percent							
Total construction volume	370.16	395.67	420.43	437.82	474.73	539.32	562.11	590.75	6.9	6.3	4.1	8.4	13.6	4.2	5.1	
Residential construction	210.43	224.81	240.92	252.70	276.37	311.81	323.60	338.62	6.8	7.2	4.9	9.4	12.8	3.8	4.6	
Commercial construction	109.68	116.29	121.97	124.78	135.26	155.58	164.10	173.99	6.0	4.9	2.3	8.4	15.0	5.5	6.0	
Public construction	50.05	54.57	57.54	60.33	63.11	72.30	75.01	79.03	9.0	5.4	4.9	4.6	14.6	3.7	5.3	
	Index 2015 = 100															
Price development	105.63	110.79	115.56	117.65	127.19	147.32	156.63	160.99	4.9	4.3	1.8	8.1	15.8	6.3	2.8	
	Real, chain index 2015 = 100															
Total construction volume	104.88	106.99	109.08	111.62	111.97	109.66	107.66	110.08	2.0	2.0	2.3	0.3	-2.1	-1.8	2.2	
By construction sector																
Residential construction	106.45	108.85	111.78	115.19	116.12	113.57	111.05	113.30	2.3	2.7	3.1	0.8	-2.2	-2.2	2.0	
Commercial construction	102.28	103.33	104.59	104.86	105.03	102.66	102.06	104.84	1.0	1.2	0.3	0.2	-2.3	-0.6	2.7	
Public construction	104.24	107.47	107.98	111.97	110.39	109.30	106.60	109.14	3.1	0.5	3.7	-1.4	-1.0	-2.5	2.4	
By producer group																
Core construction industry	107.45	110.98	113.99	117.88	117.91	115.30	112.97	115.88	3.3	2.7	3.4	0.0	-2.2	-2.0	2.6	
Renovation sector	102.62	104.13	104.87	107.21	106.73	104.85	102.97	105.01	1.5	0.7	2.2	-0.4	-1.8	-1.8	2.0	
Other producers	106.34	110.18	112.61	113.85	115.08	112.61	110.73	113.47	3.6	2.2	1.1	1.1	-2.1	-1.7	2.5	

Sources: Federal Statistical Office; DIW Construction Volume calculations.

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minus one percent in 2022, there will be a slight 0.2-percent decline in 2023 and a 2.3-percent increase in 2024.

Civil engineering offering a glimmer of hope

The situation has been less dramatic in civil engineering than in building construction. Here, new orders have still been increasing recently (Figure 1) and building permits have remained on their upward trend (Figure 5). This is likely due to, among other reasons, the fact that construction materials

required for civil engineering were less affected by material shortages and price increases compared to other construction sectors. Nevertheless, the civil engineering sector was not immune to the price increases and its production also slowed slightly at the end of 2022 (Figure 6).

The civil engineering sector can expect robust growth over the next years, as the need for infrastructure expansion is high: In a survey conducted by the German Economic Institute in Cologne, 80 percent of companies in Germany

said that the poor state of the domestic transport system, particularly the road network, were affecting their business activities.¹³ Public sector stimulus is particularly important here, and its significance is likely to increase. The base for wide-reaching infrastructure investments was decided upon in the Coalition Agreement; the government budget adopted for 2023 includes 18.6 billion euros for transport investments.¹⁴ According to the Federal Transport Plan (*Bundesverkehrswegeplan*), nearly 270 billion euros are to be invested in the maintenance, expansion, and new construction of transport infrastructure by 2030.¹⁵ Following growth of nearly 15 percent in 2022, civil engineering is likely to grow by 4.9 percent in 2023. Price-adjusted, the declines are 1.8 and 1.6 percent, respectively. In 2024, nominal growth is projected to be 5.8 percent (real: 2.7 percent).

Noticeable slowdown in all construction sectors

The decline in real construction volume affects nearly every sector of the construction industry, but the core construction industry has been particularly affected. However, planning services and deliveries of prefabricated construction units, both of which are provided by other producers, are also strongly influenced by the declines in new building construction. However, the more favorable development in civil engineering is having a stabilizing effect on real production in the aforementioned sectors.

Altogether, real construction output in the core construction industry is expected to contract at a slightly above-average rate in 2022 and 2023 compared to the other sectors. The core construction industry, however, should benefit more than other sectors from the upturn in construction activity in 2024, particularly in commercial and public-sector construction. The fluctuations in real construction output in the renovation sector are expected to be lower. Declines in new construction orders can often be substituted for renovation and modernization projects. This is particularly true for smaller companies in the renovation sector, where customers often wait a long time for an appointment for maintenance and modernization work. The development of real construction output of the renovation sector will likely barely deviate from the average of the construction volume overall in the coming years.

Despite the decline in real construction volume, the business situation for many firms in the core construction and renovation industries is likely to be positive. With capacity utilization still high by long-term standards, construction prices should still rise significantly in 2023 and 2024 and sales should continue to grow. Wages in the construction industry will increase only slightly according to the relevant

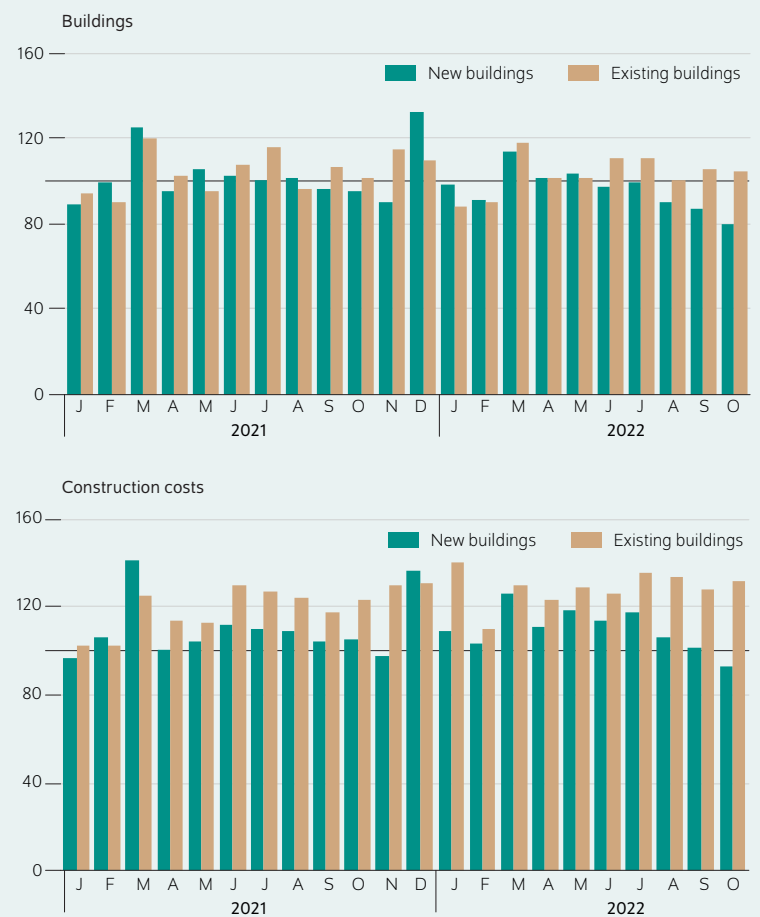
¹³ Thomas Puls and Edgar Schmitz, "Wie stark beeinträchtigen Infrastrukturprobleme die Unternehmen in Deutschland? Ergebnisse von IW-Befragungen," *IW-Trends*, no. 4 (2022): 89-110 (in German; available online).

¹⁴ Cf. Bundesfinanzministerium, *Haushaltswurf 2023 vorgestellt* (in German; available online).

¹⁵ Cf. Bundesverkehrswegeplan 2030 on the website of the Federal Ministry of Transport and Digital Infrastructure (*Bundesministerium für Digitales und Verkehr*).

Figure 8

Number of permits granted for new construction projects Monthly average in 2020 = 100



Sources: Federal Statistical Office.

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While the number of permits for new buildings dropped significantly, especially in the second half of 2022, the number remained relatively constant for existing buildings.

collective wage agreement. At the same time, energy and raw material prices are expected to settle down in 2023. Thus, the profit situation should remain satisfactory.

Conclusion: Decline in real construction work putting policymakers under pressure

Although nominal construction volume over the next years will not increase as strongly as in 2021 and 2022, it will continue to grow. At over 590 billion euros, construction spending is likely to be nearly a quarter higher in 2024 than in 2021. In contrast, real construction volumes are expected to contract in both 2022 and 2023. Even if construction activity picks up again in 2023, construction output in 2024 will be almost two percent below the 2021 level in price-adjusted terms.

The decline in real construction work is putting enormous pressure on policymakers. If they want to achieve their goals,

they will have to consider a change in strategy. Construction capacities must be significantly expanded to reach the targets that have been set. This includes, first and foremost, the construction of new housing:¹⁶ The Coalition Agreement plans for 400,000 new units per year to be constructed. However, this target has been missed by a wide margin so far: Just under 295,000 residential units were completed in 2021 and in 2022, the figure will barely be over 300,000. The measures adopted to provide tax incentives for new residential unit construction are now intended to increase incentives to eliminate the housing shortage. The focus, however, should be less on the total number of newly constructed buildings and more on the creation of low-cost housing in metropolitan areas. This can be achieved by redensifying existing housing stock, an idea that has been under discussion for years; it could provide more cost-effective housing than newly developed and expensive land. Furthermore, there are now cost-effective methods of adding stories to existing buildings.

For years, it has been known that refurbishing buildings to be more energy efficient contributes significantly to increasing energy efficiency. However, spending on energy-efficient refurbishment in residential and non-residential buildings has barely increased in years.¹⁷ A massive expansion of finan-

cial support is planned by the Federal Ministry for Economic Affairs and Climate Action. However, there is the danger that rising prices will use up a majority of the funding.

Existing plans and measures are clearly insufficient to advance residential construction and energy-efficient refurbishment. A master plan that does not solely rely on long-term subsidy programs to support demand is needed. This plan must also strengthen the expansion of planning, production, and installation capacities to prevent supply bottlenecks.

This insufficiency is also indicated by the investment backlog in municipal infrastructure, which is increasing rather than decreasing, despite politicians' assurances that remedial action will be taken.¹⁸ According to the municipalities, the investment backlog has risen to nearly 160 billion euros. A large share of the backlog in the municipalities is related to the failure to renovate schools, kindergartens, social facilities, and municipal transport infrastructure. Given the increase in construction prices, the real investment gap is likely to widen in 2023 unless municipal budgets receive more inflation compensation from the bountiful federal and state tax revenues.

¹⁶ Martin Gornig und Claus Michelsen, *Wohnungsbaupolitik auf dem Drahtseil* (Makronom: 2022) (in German; available online).

¹⁷ Gornig, Michelsen, and Révész, "Strukturdaten zur Produktion und Beschäftigung im Baugewerbe."

¹⁸ Cf. Raffer and Scheller, *KfW-Kommunalpanel 2022*; Martin Gornig, "Investitionslücke in Deutschland: Und es gibt sie doch! Vor allem Kommunen sind arm dran," *DIW aktuell* no. 19 (2022) (in German; available online).

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