German construction industry: refurbishment lacks momentum, new residential construction gets second wind

By Martin Gornig, Christian Kaiser und Claus Michelsen

The construction industry has been a key pillar of the German economy in recent years. New residential construction played a major part in this with the volume of new construction growing nominally by over 60 percent between 2010 and 2014. The development of construction work on existing residential buildings was less dynamic, however, with just under ten-percent growth between 2010 and 2014. A key reason for this is the declining volume of investment in energy-efficiency of residential buildings. Similar growth is anticipated for the German construction industry as a whole in 2015.

Construction activity will continue to boost the economy into 2016. In addition to residential construction, commercial construction and sharp increases in the volume of public construction, largely triggered by the major refugee influx, are expected to provide a positive impetus. Gradually, the German government's plans to increase investment in transportation routes and municipal infrastructure should also start to have a palpable impact.

The construction industry has been a key pillar of the German economy in recent years. This has been documented in the annual construction volume calculations published by DIW Berlin[1] which, in addition to construction volume, also include repairs that do not increase the value of the property.[2] As well as the construction industry in the narrowest sense, other sectors such as the manufacture of structural metal products, the manufacture of prefabricated buildings, building completion and finishing, planning and other services are also taken into account. The calculations by DIW Berlin complement investment figures provided by the statistical offices by differentiating between new construction activities and modernization of existing buildings.

Apart from publishing construction volume calculations and documentation in recent years, DIW Berlin also forecasts relevant values for the current and coming year (see Box 1). In these forecasts, it has been possible to differentiate between volumes of new construction and construction on existing buildings for the given calendar year since 2014. DIW Berlin has developed a new indicator specifically for this (see Box 2).[3] The 2015 and 2016 calculations are also based on DIW Berlin's economic forecasts and on the findings and estimates of the most recent Joint Economic Forecast (*Gemeinschaftsdiagnose*) conducted by the German institutes for economic research.[4]

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1 See also the definition of the term "construction volume" in DIW Berlin's glossary (in German only): http://diw.de/de/diw_01.c.433507.de/presse/diw_glossar/konjunkturbarometer.html.

2 M. Gornig et al., *Construction in Germany: Structural Data on Construction and Employment–2015 Calculations* (German Institute for Economic Research (DIW Berlin): 2015), final report commissioned by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) as part of the research program "Zukunft Bau" (future construction) by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).

3 M. Gornig et al., *The Development of a Refurbishment Indicator for Residential and Non-Residential Buildings* (German Institute for Economic Research (DIW Berlin): 2014), final report commissioned by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR).

4 F. Fichtner et al., "DIW Economic Outlook (autumn projections 2015): Upswing of German Economic Prevails," *DIW Economic Bulletin*, no. 26 (2015): 343–356; Joint Economic Forecast Project Group, *Deutsche Konjunktur stabil – Wachstumspotenziale heben* (2015).

Box 1

DIW Berlin's Construction volume forecast methods

The forecast for construction volume is embedded in DIW Berlin's macroeconomic forecast.1 Accordingly, in an initial stage, construction investment projections are carried out which can be consistently presented in the system of national accounts. Indicator-based statistical models are used for the construction investment forecast. For this purpose, the forecast value, e.g., the volume of commercial construction, is regressed on an autoregressive term and the lagged values of the relevant indicator. The forecast equation then generally takes the following form:

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

where y_t is the forecast value, x_t is the indicator, and ε_t is the error term. The parameters α, β_i and γ_j are estimated.

The lag lengths n and m (years) are determined using the autocorrelation function and/or the cross correlation function. Furthermore, the different specifications are evaluated using standard information criteria.

The forecasting quality is evaluated using ex-post forecasts. The specifications with the lowest square deviation of the forecast values from the actual values are then used for the forecast.

Incoming orders and building permits for residential construction have proven to be suitable indicators for forecasting residential construction, whereas for commercial construction, investment in capital equipment, capacity utilization, and incoming orders and/or building permits for non-residential buildings can be used.2 Public construction, however, is not determined using indicators but is instead derived from the government accounts forecast which takes into consideration both government revenue and the announced economic stimulus packages.

The individual indicators sometimes produce very different results. Construction investment is also heavily influenced by legal framework conditions—the discontinuation of the home ownership allowance, for example—and these models cannot adequately depict changes in these conditions. Consequently, these statistical procedures can only serve as a reference point for the forecast. In a second step, results for the individual aggregates of construction investment are then aligned with the remaining aggregates of the national accounts.

In a third and final step, the forecast results are transferred to the model for the construction volume calculation. In addition, bearing in mind the specific characteristics of the non-intensive construction services, the demand-side trends in the course of the economic cycle are taken into consideration. So as to differentiate by additional structural features, more detailed information on building permits and current orders is used. This enables us to estimate different developments between the individual producer groups such as the core construction industry and finishing trades.

1 On this method see, for example, D. E. Rapach and M. E. Wohar, "Forecasting the Recent Behaviour of U.S. Business Fixed Investment Spending: An Analysis of Competing Models," Journal of Forecasting, vol. 26 (2007): 33-51.

2 See J. Döpke et al., "Indikatoren zur Prognose der Investitionen in Deutschland," Kieler Arbeitspapier, no. 906 (Kiel: 1999).

New residential construction since 2010 shows clear growth but "green" retrofits faltering

Between 2010 and 2014, residential construction volume increased by a good 20 percent in nominal terms (see Table 1). This growth was predominantly driven by the strong upturn in new residential construction. After bottoming out in 2010, new residential construction had grown by over 60 percent in nominal terms by 2014. Growth in the construction of apartment buildings was particularly strong with new construction volume almost doubling. An almost 40-percent increase in the construction of owner-occupied properties was also recorded.

Growth of construction work on existing buildings was far less dynamic, however. Between 2010 and 2014, overall growth in spending on modernization and maintenance fell short of ten percent. A key reason for this is the downward trend in spending on energy-efficient refurbishment[5] which declined by a total of 15 percent between 2010 and 2014. It is likely that this development was primarily the result of a reduction in subsidies for photovoltaic systems. From 2010 to 2014, investment in small photovoltaic installations on residential build-

5 Energy efficient refurbishments are accounted by the volume of sales in the of the product sectors thermal insulation, replacement of windows, refurbishment of heating systems as well as solar thermal heaters and photovoltaik panels, see Heinze 2015, a.a.O.

Box 2

Projection of construction volume on existing buildings

To estimate the volume of construction on existing buildings, data from DIW Berlin's construction volume calculations are combined with data from official statistics. Statistics referring to the number of employees subject to social insurance contributions are used in conjunction with construction industry statistics. Both sets of statistics are published with around a six-month delay, are available on a quarterly basis, and are also broken down into economic sectors. The official statistics provide six different time series per economic sector, which, when combined, describe the economic activity in that particular sector: the number of people employed in the sector, number of hours worked, number of companies, and company turnover.

Since it is not possible to know in advance what economic variables within the sector are particularly suited to approximating the volume of construction on existing buildings, a principle components analysis is conducted to bundle the information about the activities in the relevant economic sectors. This contributes to the robustness of the regressor since one-off effects which only relate to a specific variable but not economic activity per se, such as wage increases, for example, are filtered out. Further, the length of the time series used is also insufficient to include a larger number of variables simultaneously as regressors. The principal component analysis circumvents this problem. The missing data for the last two quarters of the current year are extrapolated using the seasonal pattern. As a result, the volume of construction on existing buildings is estimated for the current year. The volume of new construction is calculated as the difference between construction on existing buildings and total construction volume.

Tabelle 1

Residential construction

	2010	2011	2012	2013	2014	2015	Percentage change 2014/2010
	In billion euros at the respective year's prices						
New construction volume[1]	32.90	40.98	44.30	47.81	53.03	57.06	61.2
Single Family and detached buildings	24.16	29.41	30.61	31.56	33.64		39.2
apartment buildings	8.74	11.57	13.69	16.25	19.39		121.9
Construction on existing buildings[2]	118.87	123.86	127.24	127.25	130.26	134.50	9.6
Energy efficient refurbishment	40.89	40.21	37.27	35.40	34.78		−15.0
Total residential construction volume	151.77	164.84	171.54	175.06	183.29	191.56	20.8
	Change on the previous year in percent						
New construction volume[1]		24.6	8.1	7.9	10.9	7.6	
Single Family and detached buildings		21.7	4.1	3.1	6.6		
apartment buildings		32.4	18.3	18.7	19.3		
Construction on existing buildings[2]		4.2	2.7	0.0	2.4	3.3	
Energy efficient refurbishment		−1.7	−7.3	−5.0	−1.8		
Total residential construction volume		8.6	4.1	2.0	4.7	4.5	
	Shares in %						
New construction volume[1]	21.7	24.9	25.8	27.3	28.9	29.8	
Single Family and detached buildings	15.9	17.8	17.8	18.0	18.4		
apartment buildings	5.8	7.0	8.0	9.3	10.6		
Construction on existing buildings[2]	78.3	75.1	74.2	72.7	71.1	70.2	
Energy efficient refurbishment	26.9	24.4	21.7	20.2	19.0		
Total residential construction volume	100.0	100.0	100.0	100.0	100.0	100.0	

1 Proxied 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.

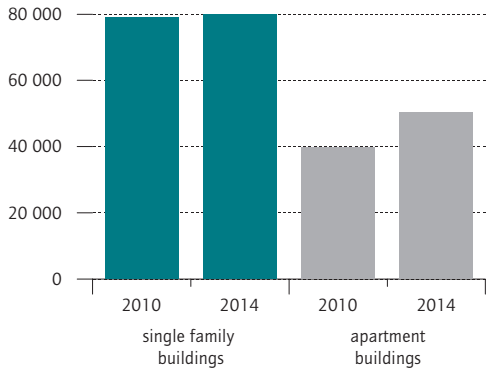
Sources: Statistisches Bundesamt; Berechnungen des DIW Berlin.

In 2016, the volume of residential construction will continue to increase significantly.

Figure 1

Market volume in residential construction on existing buildings in 2010 and 2014 according to types of buildings in single family buildings and apartment buildings

In Millionen Euro

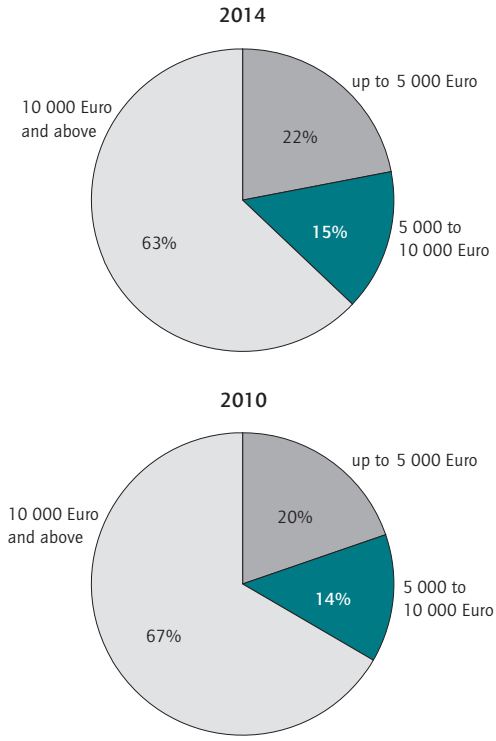


Source: Structure of investment activity in the residential and non-residential properties, household survey 2015 and own calculations.

Investment in existing dwellings has increased especially in apartment buildings.

Figure 2

Market volume of residential construction in existing dwellings, 2010 and 2014 by project size classes



Source: Structure of investment activity in the residential and non-residential properties, household survey 2015 and own calculations.

In particular, the share of smaller modernization projects has increased.

ings declined by an estimated six billion euros.[6] If photovoltaic systems are excluded, the volume of expenditure on energy-efficient refurbishment since 2010 remains constant at just under 34 billion euros.

Apartment building construction and small-scale projects increasingly important

Also based on other characteristics, a major restructuring of the market for the modernization of existing buildings can be observed.[7] The increase in investment between 2010 and 2014 was primarily focused on the construction of apartment buildings (an increase of 27 percent to more than 50 billion euros in 2014), while investment in owner-occupied properties remained more or less constant (see Figure 1). In 2010, owner-occupied properties accounted for more than two-thirds of construction work on existing buildings, while in 2014 the corresponding figure was only 61 percent. This development ran parallel to new residential construction activity which notably has experienced a boom in the construction of multifamily residences in recent years. The high demand for housing in urban conurbations and, principally, the lack of investment alternatives prompted private landlords to modernize their properties. Nevertheless, the percentage of energy-efficient refurbishments has declined, even among multifamily residences—measured against total volume of existing building modernizations, the share has fallen from 33 to 29 percent.

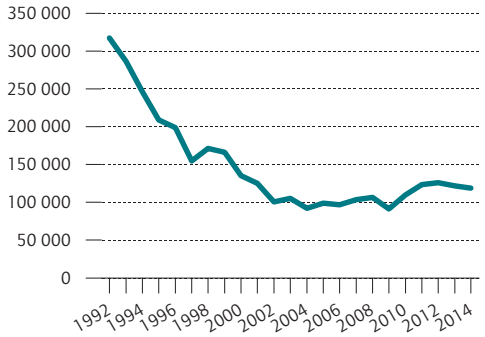
There is also evidence of a structural shift toward smaller-scale construction measures on existing buildings: although construction projects with an investment volume of 10,000 euros or more still accounted for 63 percent and therefore the majority of all construction work on existing buildings in 2014, the 2010 figure was still four percentage points higher (see Figure 2). Conversely, the significance of smaller-scale construction activities has increased. The average sum invested in each mod-

6 The sales development estimate is based on analyses of statistics from the solar power industry. In 2010, investment was a good seven billion euros and in 2014, just under one billion euros. On methodology for this, see also Gornig/Hagedorn, 2014.

7 Heinze survey of market for existing buildings, 2015.

Figure 3

Divested land for construction of residential buildings
In 1 000 square-metres

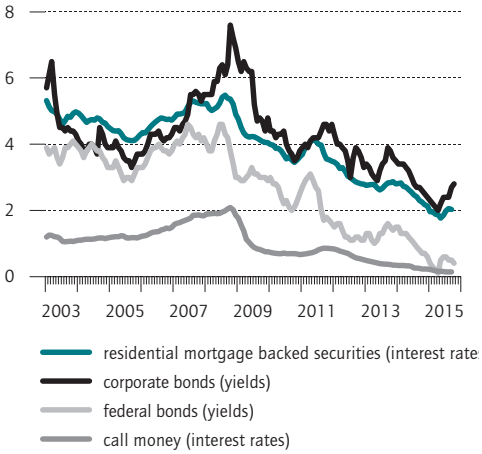


Source: Federal Statistical Office.

Land sales are still at a low level.

Figure 4

Yields and interest rates
In percent



Source: Bundesbank.

The returns on alternative investments are still low.

ernization project was 3,900 euros in 2010 and around 3,450 euros in 2014. One reason for this shift is that partial modernization (nine-percent increase) and building repairs/maintenance (14-percent increase) have become more important over time while comprehensive modernization measures have declined.

General conditions remain positive

Expectations for residential construction in 2015 are generally positive. Once again, new construction is the engine for growth. New residential construction is anticipated to increase by almost eight percent in 2015 to a value of approximately 57 billion euros (see Table 1). Given the current high level of immigration to Germany, however, this growth is unlikely to come close to resolving the housing shortage which is particularly an issue in urban conurbations. Model calculations indicate that around 400,000 new homes would have to be built every year for the next five years to ease the situation. Last year, however, only 245,000 residences were constructed. A major stumbling block here is the availability of building land: despite the strong growth in new construction, the amount of building land sold recently is no higher than in previous years (see Figure 3).

With regard to existing residential buildings, the overall conditions for investment are currently extremely favorable: the labor market is stable and income is on the increase. Interest rates on building capital are still exceptionally low and returns on alternative investments are modest (see Figure 4). Further, the large number of refugees arriving in Germany is likely to provide additional impetus for growth in the volume of existing residential buildings being refurbished. Overall, demand for housing in the lower quality segment is set to rise, which will likely lead to an increase in renovations and cosmetic repairs.

What remains unclear is how the rent cap introduced by the German government will affect the volume of construction on existing buildings. The extent to which landlords can pass the cost of refurbishment on to new tenants is also likely to be a source of uncertainty. The federal states have been working toward implementing the regulation since the summer—the rent cap has already come into effect in municipalities in Bavaria, Baden-Württemberg, Berlin, Hamburg, Rhineland-Palatinate, and North Rhine-Westphalia.[8]

Construction work on existing residential properties will increase substantially this year by an estimated 3.3 percent over 2014 to reach a value of 134.5 billion euros (see Table 1). Growth is expected to intensify further in the second half of the year: the upward trend in incoming orders signals a busy fall for residential construction although at the end of 2014/beginning of 2015 it

8 See Law on Attenuating the Rent Increase in Overstretched Property Markets and Strengthening the Purchaser Principle Regarding Estate Agents (*Mietrechtsnovellierungsgesetz , MietNovG*), *http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl115s0610.pdf*, last accessed October 29, 2015.

seemed that growth would markedly decelerate or even stop (see Figure 5).

Non-residential construction: almost no growth since 2010

For some years now, nominal growth in the volume of non-residential construction has been minimal. From 2010 to 2014, growth was a similarly negligible eight percent (see Table 2). Both the residential and non-residential construction sector have recorded higher growth rates in new constructions although the difference between new construction and investment in existing buildings is much smaller in the non-residential sector: new construction volume increased by around 15 percent between 2010 and 2015 while the corresponding figure for the volume of construction on existing buildings was below five percent.

Investment in new construction is currently subject to strong fluctuations. In 2011, for instance, construction of new production, retail, and warehouse buildings increased sharply (by 15 percent). Conversely, in 2014, new construction in this sector stagnated and for non-residential buildings such as offices it actually declined substantially (by 2.5 percent).

In 2012 and 2013 in particular, construction on existing non-residential buildings did not develop favorably. One reason for this could be that the impact of the economic stimulus programs on public construction began to wane over this period. At the same time, growth in energy-efficient refurbishment of non-residential buildings was also very restrained. Growth in the nominal construction volume did not occur here until 2014 (see Table 2).

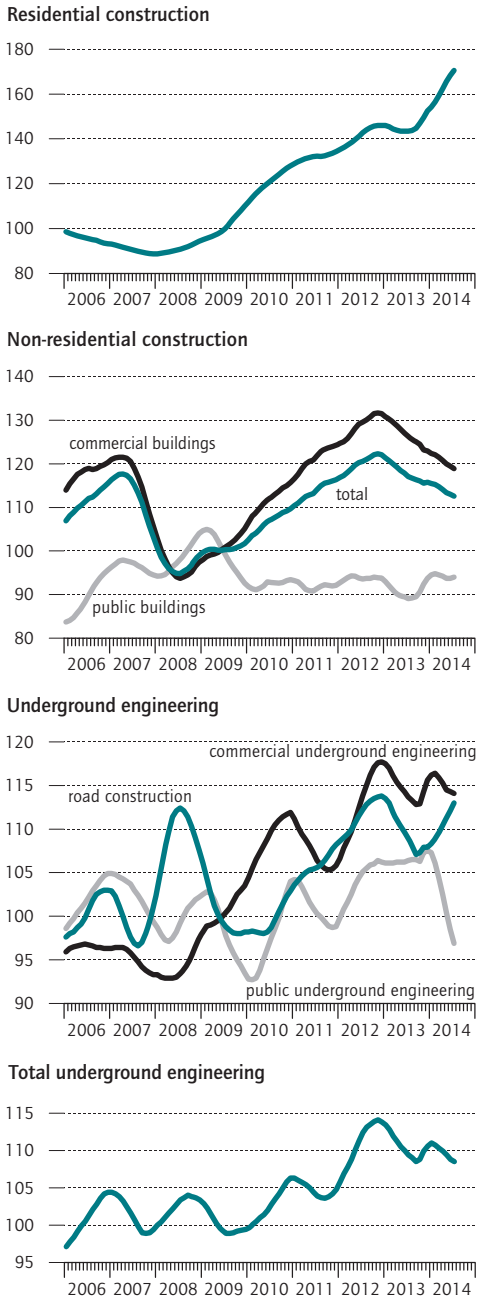
In 2015, once again, it is unlikely there will be very much change in the volume of *commercial construction* compared to 2014. After a strong start to the year because of mild weather conditions, companies again invested much less in the expansion and maintenance of their production plants. Since the spring, sentiment has cooled considerably, in the manufacturing sector in particular.[9] This is reflected in the trend of incoming orders which is following a clear downward path in the commercial structural engineering sector and stagnating in the commercial civil engineering sector (see Figure 5).

Public construction had an extremely weak start to 2015. Nevertheless, the volume of construction on existing buildings in this sector in particular is expected to increase toward the end of the year when municipalities

9 Ifo Institut, "ifo Geschäftsklimaindex gibt nur leicht nach," press release, October 26, 2015.

Figure 5

Incoming orders in core construction industry
2005 value index = 100[1], trend components



1 Seasonally adjusted according to the Berlin Procedure (BV4).

Sources: Federal Statistical Office; calculations by DIW Berlin.

Incoming orders at the current end show in both, commercial construction as well as in industrial and civil engineering, a downward trend.

will have to spend large sums of money on temporary housing for refugees who, so far, have mainly been living in accommodation, such as tents, that is not suited for the winter. Refurbishment and repairs will be required to ensure buildings which have been unused for a prolonged period are fit for occupancy. However, these refurbishment activities will not reduce the considerable investment backlog at the municipal level which was already present in the field of construction on existing buildings before the flow of refugees increased.[10] On the contrary, the temporary challenges presented by the massive influx of refugees is more likely to mean that necessary repairs and investment in construction on other existing public buildings will continue to be neglected, thereby further contributing to the investment backlog.

Overall, this signals a slight increase in the volume of construction on existing commercial and public buildings in 2015 (one percent compared to 2014). Following a decline in 2014, the volume of new non-residential construction is expected to fall slightly again in 2015 (see Table 2).

Table 2

Non-residential construction volume

	2010	2011	2012	2013	2014	2015
	In billion euros at the respective year's prices					
New construction volume	27,3	29,6	30,4	31,7	31,4	31,2
Production-, Retail-, Storage buildings[1]	12,0	13,8	14,5	14,4	14,5	
other non-resdiential buildings[2]	15,3	15,8	15,9	17,3	16,9	
Construction on existing buildings	55,6	58,5	56,8	55,8	58,2	58,7
energy efficient refurbishment	16,6	17,7	17,1	17,0	17,5	
Total construction volume[3]	82,9	88,1	87,3	87,6	89,5	89,9
	Change on the previous year in percent					
New construction volume		8,4	2,8	4,3	−1,2	−0,5
Production-, Retail-, Storage buildings[1]		15,0	5,2	−0,6	0,4	
other non-resdiential buildings[2]		3,1	0,8	8,6	−2,5	
Construction on existing buildings		5,2	−2,8	−1,8	4,2	0,9
energy efficient refurbishment		6,5	−3,5	−0,4	2,9	
Total construction volume[3]		6,3	−0,9	0,3	2,2	0,4
	Shares in %					
New construction volume	33,0	33,6	34,9	36,2	35,0	34,7
Production-, Retail-, Storage buildings[1]	14,5	15,6	16,6	16,5	16,2	
other non-resdiential buildings[2]	18,5	18,0	18,3	19,8	18,9	
Construction on existing buildings	67,0	66,4	65,1	63,8	65,0	65,3
energy efficient refurbishment	20,1	20,1	19,6	19,5	19,6	
Total construction volume[3]	100,0	100,0	100,0	100,0	100,0	100,0

1 Including agricultural buildings.
2 Including other agricultural buildings.
3 Construction volume in commercial and public construction.

Source: Construction volume calculations by DIW Berlin.

In the non-residential sector, construction dynamics are still weak.

10 M. Gornig, C. Michelsen, and K. van Deuverden, "Local Public Infrastructure Showing Signs of Wear and Tear," *DIW Economic Bulletin*, no. 42/43 (2015): 561-568.

Tabelle 3

Key figures for development of construction volume in Germany

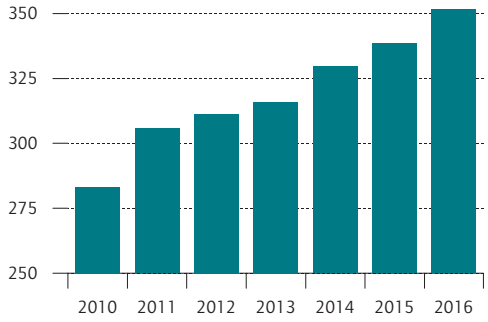
	2010	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
Total construction volume													
Price development	283,30	305,73	311,40	315,90	329,50	338,48	351,61	7,9	1,9	1,5	4,3	2,7	3,9
Real, chain index 2005 = 100								3,3	2,5	2,1	2,0	1,8	2,0
Total construction volume													
By construction sector	106,58	111,47	110,80	110,10	112,70	113,72	115,89	4,6	−0,6	−0,6	2,4	0,9	1,9
Residential construction													
Commercial construction	103,44	108,64	110,20	110,20	113,10	116,20	118,71	5,0	1,4	0,0	2,6	2,7	2,2
Public construction	112,97	119,72	119,30	116,90	118,80	116,84	117,98	6,0	−0,4	−2,0	1,6	−1,7	1,0
By producer group	105,76	106,05	96,80	97,50	100,20	99,30	102,04	0,3	−8,7	0,7	2,8	−0,9	2,8
Core construction industry													
Finishing trades	99,63	107,32	107,30	108,00	113,50	114,40	117,00	7,7	−0,0	0,7	5,1	0,8	2,3
Other construction services	115,59	117,43	115,80	114,00	114,90	116,10	117,90	1,6	−1,4	−1,6	0,8	1,0	1,6
Sonstige Bauleistungen	103,04	108,80	108,50	107,80	109,60	110,90	114,00	5,6	−0,3	−0,7	1,7	1,2	2,8

Source: Construction volume calculations by DIW Berlin.

Construction volume is expected to grow strongly for residential building in 2016.

Figure 6

Construction volume
annually, in billion Euro at current year's prices

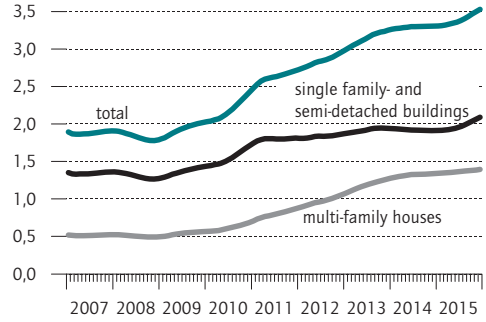


Source: Construction volume calculations by DIW Berlin.

Construction volume is also expected to increase significantly in 2016.

Figure 7

Building permits in new residential construction
In billion euros, trend components[1]



1 Seasonally adjusted according to the Berlin Procedure (BV4).

Sources: Federal Statistical Office; calculations by DIW Berlin.

Currently, the construction permits for single family homes are gaining momentum.

Outlook for 2016: construction volume continues to increase

DIW Berlin anticipates a strong increase in nominal construction volume of 2.7 percent over 2014 to a current value of approximately 338.5 billion euros (see Table 3 and Figure 6). For 2016, development is likely to be equally positive: overall, construction volume is expected to grow by 3.9 percent to around 351.6 billion euros. Despite the high capacity utilization rate of the construction industry—which has now reached the same level as during the post-reunification boom of the mid-1990s—there will in fact only be a moderate rise in construction prices. This is primarily due to currently very low commodity prices, particularly the price of crude oil, which are expected to remain at a similarly low level into 2016.[11] Prices are forecast to increase by 1.8 percent this year and two percent in 2016. Consequently, growth of real construction volume will regain momentum with an increase of 0.9 percent this year and 1.9 percent in 2016.

Above all, the number of approved new residential properties signals a continuation of the positive trend in construction activity for 2016 (see Figure 7). Even in the past few months, building permits for single-family homes and duplexes in particular have risen sharply. However, in light of the tightening of the German Building Energy Conservation Ordinance (*Energiesparverodnung, EnEV*) in 2016, we should rein in our expectations. We can assume that many applicants wanted to secure their building permits under the existing law in order to circumvent the more stringent energy efficiency requirements that will come into force in 2016 (around 25-percent lower permissible primary energy demand for new buildings). It is therefore not a foregone conclusion that construction will start with any immediacy.[12] Due to this pull-forward effect, we should expect a decline in building permits in late 2015/early 2016. Real growth in the volume of residential construction of around 2.2 percent is forecast for 2016. As a result of the strong increase in demand, however, growth could be even higher as long as the construction industry is able to develop the necessary capacity.

For commercial construction, we can assume substantially more restrained growth. Currently, only building permits for retail and warehouse buildings are on an upward trend. A downward trend has been observed for some time in the construction of factory and workshop buildings as well as office and administrative buildings—and the cyclical low has yet to be reached (see Figure 8). This trend is in keeping with the widespread economic climate of an upswing driven primarily by consumption.[13] The weak economic situation in China and the prevailing crisis in the euro area in particular are

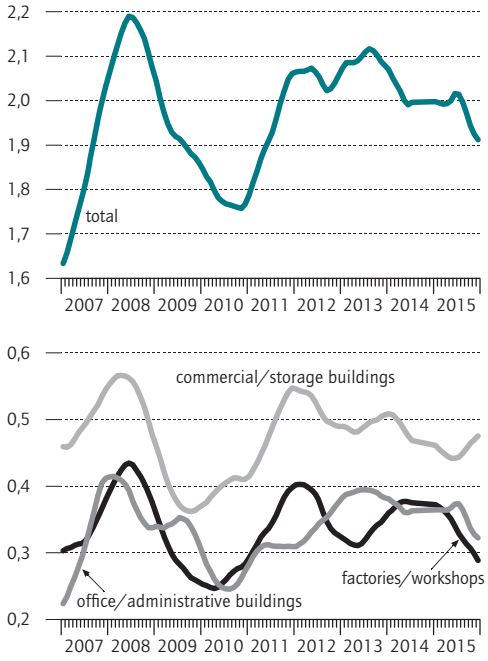
11 Currently, the commodity markets assume an oil price of just under 55 US dollars per barrel of Brent Crude Oil by the end of 2016, as signaled by futures.

12 See "Second Ordinance amending the German Building Energy Conservation Ordinance" (*Energieeinsparverordnung, EnEV*) of November 18, 2013, *Federal Law Gazette* (*Bundesgesetzblatt*), part I, no. 67 (2013).

13 F. Fichtner et al., "DIW Economic Outlook (autumn projections 2015): Upswing of German Economic Prevails," DIW Economic Bulletin, no. 26 (2015): 343–356; Joint Economic Forecast Project Group, Deutsche Konjunktur stabil – Wachstumspotenziale heben (2015).

Figure 8

Building permits in non-residential construction
In billion euros, trend components[1]



1 Seasonally adjusted according to the Berlin Procedure (BV4).

Sources: Federal Statistical Office; calculations by DIW Berlin.

Currently, the trends of building permits for production, trade and warehouse building are negative.

likely to deter manufacturing companies from investing in any major expansion in 2016, too. Against this backdrop, DIW Berlin has forecast a moderate increase in the volume of commercial construction of only one percent in real terms.

After a weak 2015 (volume is forecast to decline by 0.9 percent compared to 2014), *public construction* is expected to grow strongly in 2016. Additional resources from the municipal investment promotion fund will support this development. Further funding for infrastructure expansion has already been approved. What remains uncertain so far, however, is the impact the additional expenditure for accommodating asylum-seekers will have. It is expected to deter the less affluent municipalities in particular from investing in construction on public buildings. Should the influx of refugees continue unabated into 2016, the additional funds provided to fit out premises to accommodate refugees are likely to act as a positive stimulus for construction activity. Overall, the volume of public construction is forecast to increase by a good 2.8 percent in 2016, adjusted for inflation.

It is anticipated that the different construction segments will profit in equal measure from the forecast developments in 2015. This is evidenced particularly by the anticipated upturn in construction on existing residential buildings. Nevertheless, in 2016, the core construction industry is predicted to experience above-average growth since the companies in this segment are set to benefit more from growth stimuli in commercial and particularly public construction. Consequently, in 2016, construction volumes in the core construction industry are anticipated to increase by 2.3 percent, while the corresponding growth figure for the finishing trades is 1.6 percent.

Challenge energy-efficient refurbishment

After a long period of stagnation, conditions for the construction industry are currently exceedingly favorable. In light of the high demand for housing, low interest rates, and less lucrative investment alternatives, residential construction in particular is performing well. The only potential need for policy action would be primarily to create the conditions for additional residential construction in sought-after urban conurbations and specifically to secure accommodation for refugees.

At the same time, energy-efficient refurbishment of buildings is causing concern. The environment is ripe for major progress to be made in this area. Compared to the majority of other investment options, investment in energy efficiency measures ought to have become increasingly attractive (despite the currently low heating energy prices). However, it is evident that growth in energy efficiency investment is in fact comparatively weak. Not only is the volume of subsidies awarded by the German reconstruction loan corporation KfW Group for energy-efficient refurbishment of existing buildings on the decline,[14] but the total volume of energy efficiency investment has also stagnated recently. The analyses presented in the current report show that, to a large extent, this is due to the wait-and-see attitude of real estate owners in the single-family and duplex residential segments who occupy their own properties. If at all, they are only tending to carry out small-scale construction projects on their homes instead of comprehensive modernization. In light of these developments, the German government's interim objective to reduce primary energy demand in the buildings sector by 20 percent by 2020 is increasingly being called into question.

14 C. Michelsen, K. Neuhoff, and A. Schopp, "Using Equity Capital to Unlock Investment in Building Energy Efficiency?," *DIW Economic Bulletin*, no. 19 (2015): 259-265.

Political decision-makers have been trying to buck this trend for years by providing considerable subsidies. Alongside regulation and information campaigns, the primary mechanisms in this context are subsidized loans and repayment bonuses from the KfW and also funding approved for the installation of modern heating systems through the Market Incentive Programme (MAP) implemented by the Federal Ministry for Economic Affairs and Energy. Despite the attractive conditions, these mechanisms have clearly failed to increase the volume of energy-efficient refurbishment to date.

New stimuli were agreed in the National Action Plan on Energy Efficiency (NAPE) based on debates conducted by a diverse expert platform. Many of the measures planned here have not yet been implemented, however. The most prominent example of this are tax incentives for energy-efficient refurbishment which have not yet come into force and are also intended for owner-occupiers. The agreed annual volume of one billion euros should be available for a total of five years. Given the prevailing low-interest environment, this could compensate for the less attractive incentives provided by KfW promotional funds.

The downside of a measure of this type, however, would be that—assuming the promotional scheme retains this fixed subsidy volume—it would probably result in one-off effects, similar to the scrapping premium for cars. A sustainable increase in the refurbishment rate, measured by the number of refurbishment projects, is unlikely: potentially, the additional financial incentives would appeal to owners whose properties would have had to be refurbished in the near future anyway, irrespective of subsidies. Should these proprietors be tempted to bring their refurbishment projects forward, then the routine refurbishment of these properties could no longer be expected in the subsequent period. To ensure a sustainable rise in the refurbishment rate, constant increases in subsidies are necessary to ensure that the refurbishment projects that are postponed further and further into the future are in fact implemented in the present. Instead of focusing on the number of projects, we could therefore concentrate on the quality of the refurbishment which is already planned in any case: more vigorous promotion of efficiency standards—through the aforementioned tax advantages, for example—would have a sustainable impact. This would also thwart the trend of declining volumes of refurbishment projects.

Alternative mechanisms which, however, have so far played a lesser role for existing owner-occupied properties, are models of energy savings performance contracting.[15] Mechanisms like this, which will also be promoted in future, are perceived as having major potential, at least in academic circles. However, according to data provided by industry associations, the entire contracting branch currently only has a total turnover of just under two billion euros. Even with rapid growth, this branch is unlikely to be able to make a notable contribution to meeting climate targets in the short term. Nevertheless, contracting appears to be the key to achieving a higher refurbishment rate in the medium term since these models could resolve significant incentive asymmetries.[16]

15 Energy savings performance contracting is an alternative financing model for energy efficiency investment. Developers who currently do not want to create higher energy efficiency standards can sign a contract with an energy service company who will take on the investment. This partner will then invest in improving energy efficiency and will profit for a defined period from the return on that investment–for example, through savings on heating bills by installing an efficient heating system. At the end of this period which is typically between 10 and 20 years, the system becomes the property of the owner of the building. Ideally, using a model like this will see neither partner worse off than before, while energy consumption is reduced.

16 C. Michelsen, K. Neuhoff, and A. Schopp, "Using Equity Capital to Unlock Investment in Building Energy Efficiency?," *DIW Economic Bulletin*, no. 19 (2015): 259-265.

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JEL: E32, E66

Keywords: Construction industry, Green retrofits, Energy efficiency investment, economic outlook

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Translation
HLTW Übersetzungen GbR

Layout and Composition
eScriptum GmbH & Co KG, Berlin

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Sale and distribution
DIW Berlin