European Commission

European Construction Sector Observatory

Country profile Germany

June 2018

In a nutshell

In 2014, there were 650,813 enterprises operating in the **broad construction sector** in Germany, predominantly micro, small and medium. Production in construction registered an overall growth rate of 10.4% over 2010-2016. In particular the civil engineering segment recorded a strong performance over this period (+18.6%), while growth in the construction of buildings stood at 8.5%. In parallel, employment in the broad construction sector in Germany increased considerably since 2010 growing from 2,938,001 to 3,820,706 in 2016 (+30.6%).

Production in construction evolution 2010-2016 ↑ **10.4%**

The **housing market** is facing strong demand fuelled by rising incomes, low interest rates as well as high levels of net migration. Indeed, it is estimated that 3.6 million migrants will have arrived to Germany until 2020. There is housing demand for at least 350,000 new dwellings per year. Low interest rates coupled with rising incomes have contributed to increased property prices, in particular in big cities, making it more difficult for middle class households to afford housing. To alleviate some of the pressure in the housing market, the government introduced the so-called Housing Construction Campaign, namely a comprehensive package of measures aimed at tackling housing shortages and rising house prices.

Total **investment in construction** increased by 9.5% over 2008-2015. Following a long period of low public investment in public infrastructure, measures taken by the federal government to unlock investment at federal, regional and municipal level have already shown some effect, with the investment backlog at municipal level decreasing by 7.4% in 2016 compared to 2015. Notably, road and traffic infrastructure account for the largest share of the investment gap at municipal level (27 %).

Investment in construction evolution 2008-2015 ↑ **9.5%**

Since the political push to decarbonise the economy (Energiewende), Germany made substantial efforts to make its **building stock more energy efficient** by setting a comprehensive regulatory and policy framework. Indeed, 4.6 million dwellings have either been refurbished or constructed as energy-efficient by design over 2006-2016. The construction industry is faced with an important **shortage of skills**, as two-thirds of construction companies are experiencing issues in finding suitably qualified staff.

Overall, the **outlook** for the construction sector is strong, driven by a booming housing market and positive developments for all market segments. Indeed industry's expectations are very positive, predicting an overall turnover growth of 4% in 2018.

1
Key Figures

In 2016, there were **650,813** enterprises operating in the broad construction sector in Germany, with the narrow construction sector (NACE F) accounting for 55.6% of the total (Figure 1). The number of companies in the broad construction sector has increased by 21.2% since 2010 (536,874), with the most significant increase occurring in 2013-2014 (+22.3%). Since a low point in 2010, **production** in construction has been fluctuating, but registered an overall growth rate of 10.4% over 2010-2016. In particular the civil engineering segment recorded a strong performance over this period (+18.6%), while growth in the construction of buildings stood at 8.5% (Figure 2).

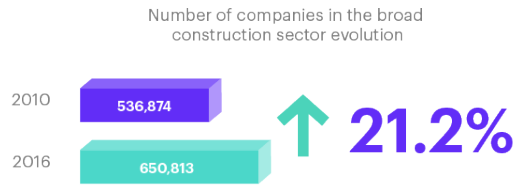
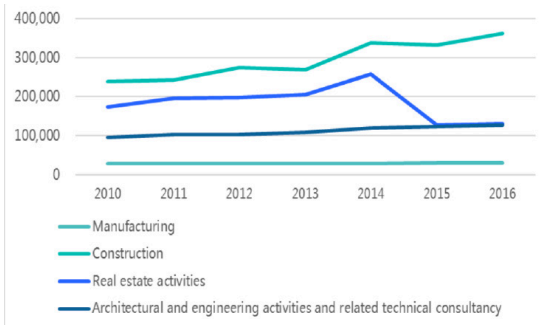
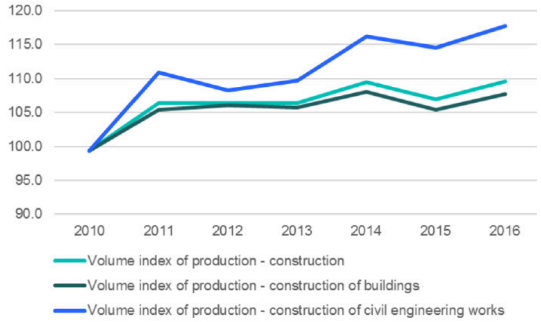


Figure 1: Number of enterprises in the construction sector in Germany between 2010-2016



Source: Eurostat, 2017.

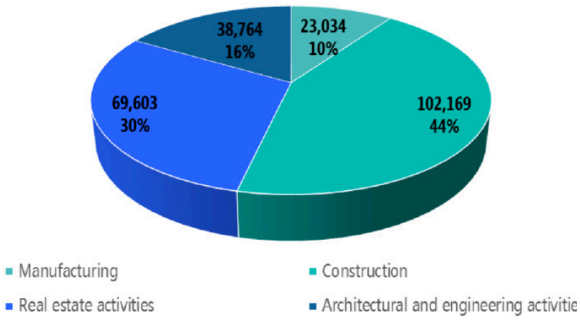
Figure 2: Volume index of production in construction in Germany, 2010-2016 (2010=100)



Source: Eurostat, 2017.

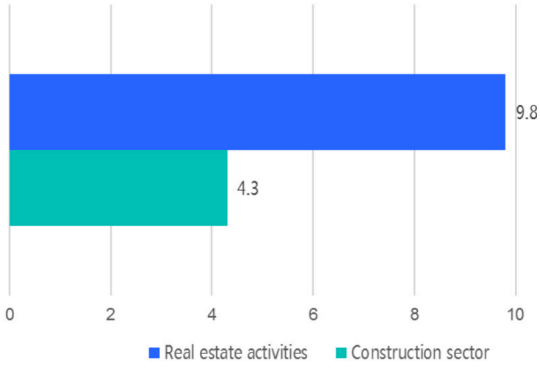
In 2016, the total **value added** of the broad construction sector was EUR 233.6 billion (Figure 3), with the narrow construction sub-sector having the largest share (43.7%, i.e. EUR 102.2 billion). It was followed by real estate activities with a share of 29.8% (EUR 69.6 billion), architectural and engineering activities with 16.6% (EUR 38.7 billion), and manufacturing with 9.9% (EUR 23.0 billion). In terms of gross value added as a share of GDP[1], real estate had the highest share (9.8%) in 2016, followed by narrow construction (4.3%) (Figure 4).

Figure 3: Value added in the Germany construction sector in 2016 (EUR m)



Source: Eurostat, 2017.

Figure 4: Gross value added as a share of GDP in the Germany construction sector in 2014 (%)



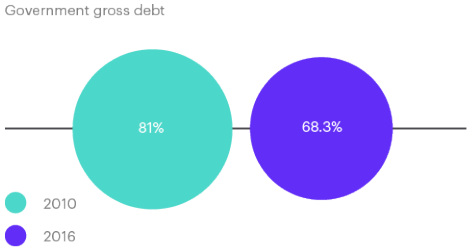
Source: Eurostat, 2017.

2
Macroeconomic Indicators

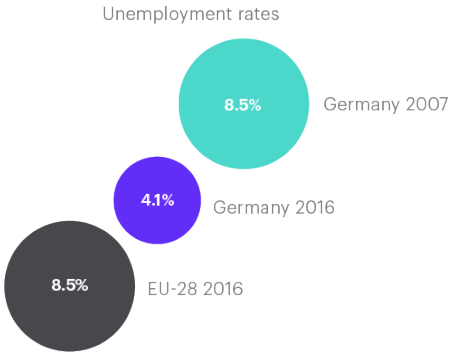
In 2016, the **GDP** of Germany amounted to **EUR 2,843 billion**, representing a 1.9% increase since the previous year. Compared to other EU countries, the German economy suffered less as a consequence of the global economic crisis, experiencing a recession only in 2009.

In 2016, the **GDP** of Germany amounted to **EUR 2,843 billion**, representing a 1.9% increase since the previous year. Compared to other EU countries, the German economy suffered less as a consequence of the global economic crisis, experiencing a recession only in 2009. Growth was mainly driven by **private consumption**, which for the second year in a row increased strongly at 2 % or 1 pp. above its long-term growth. **Public consumption** and investment accelerated markedly over 2015 and 2016, driven importantly, but not exclusively, by expenditure on refugees. **Private investment** growth was mainly driven by very dynamic housing investment.

General **government expenditure** in Germany has been fairly constant over the past years, reaching 44.3% of GDP in 2016. Despite heightened levels of **government spending** during the crisis years, Germany has recently carried out a fiscally conservative policy registering a balanced budget in 2012 and 1% general **government deficit** in 2013. In 2016, it recorded a slight surplus of 0.8%, overshooting the 3% deficit threshold of the EU's Stability and Growth Pact (SGP). The general **government gross debt** has been continuously declining since the peak in 2010 (81%) reaching 68.3% in 2016.



In 2016, the average **unemployment rate** in Germany stood at 4.1%[2], well below the EU-28 average (8.5%). Unemployment decreased continuously since its peak in 2007 at 8.5%. Youth unemployment (below 25 years) at 7.1% is above the national average, but well below the EU 28 average of 18.8%, highlighting the competitiveness of the German economy. Despite an increase in part time work, especially among women, the labour market potential of certain groups remains underused and disincentives to work remain in place, particularly for second earners[3].



Lending to non-financial corporations has been relatively steady since 2010 and in 2016 stood at EUR 797 billion. Germany's banks have regained stability since the financial crisis, with low levels of non-performing loans (1.9%) compared to EU levels. As a result, financing conditions for firms are overall positive. Instead, the key challenge of the German banking system is maintaining profitability[4].

In terms of demographics, the **total population** of Germany amounted to 82.5 million people in 2016. While the population in Germany shrank between 2002 and 2010, this trend has reversed over the last six years due to positive net migration. Immigration peaked in 2015, when 2.1 million people migrated to Germany, while 1 million emigrated resulting in a net migration of 1.1 million people (1.4 % of total population), the highest annual inflow since the 1950s[5]. The population of Germany is expected to increase with 3.0% by 2030.

In 2016, Germany's **working age population** accounted for 65.8% of its total population. However, this is projected to decline to 57.5% by 2050. Moreover, the forecast increase in the proportion of elderly people from 21.1% in 2016 to 29.4% % in 2050 is expected to drive the demand for social infrastructure such as hospitals, but also for housing adapted to their mobility requirements. An extra 2.9 million homes will need to be structurally adapted to demographic changes by 2030[6].

3

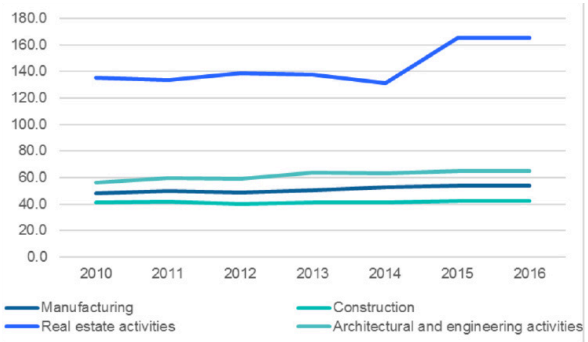
Key economic drivers of the construction sector

Productivity

Labour productivity in the broad construction sector dropped substantially in 2008 (-9.5%) and 2009 (-4.9%), but subsequently recovered reaching EUR 61,500 in 2015, but still 7.1% below the pre-crisis level of 2007.

Labour productivity in the broad construction sector dropped substantially in 2008 (-9.5%) and 2009 (-4.9%), but subsequently recovered reaching EUR 61,500 in 2015, but still 7.1% below the pre-crisis level of 2007. As for labour productivity within the subsectors, there was modest growth in the narrow construction sector over 2010-2016 (3.9%), strong growth for architectural and engineering services (+15.9%) and manufacturing (+11.7%) and very strong growth in the real estate sector (+22.0%) (Figure 7). In absolute terms, in 2016 productivity in the real estate sector stood at EUR 165 000 per person employed, which is almost four times higher than the productivity per person in the narrow construction sector – EUR 42.7. Improvements in the digitalisation in the construction sector (see Section 5) are expected to lead to higher productivity.

Figure 5: Labour productivity in the construction sector in Germany over 2010-2016(EUR k)



Source: Eurostat, 2017.

Profitability

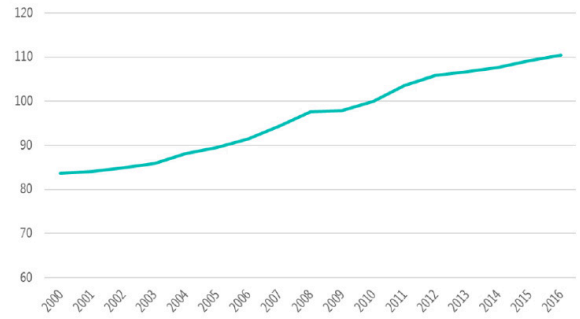
In 2016, the broad construction sector in Germany reached a total **turnover** of EUR 514 billion, a 36.4% increase from EUR 377.3 billion in 2010. Narrow construction registered the largest share of turnover within the sector accounting for 51.0%, followed by real estate activities (22.2%), manufacturing (13.9%), and architectural and engineering activities (13.0%).

Total turnover in the broad construction sector

At the same time, the gross operating surplus of the broad construction sector largely recovered since the economic crisis, marking a growth rate of 26.0% over 2010-2015 from EUR 85.2 billion to EUR 107.3 billion. The largest increases in gross operating surplus were registered for narrow construction (+60.8%) and architectural and engineering activities (+50.3%). On the other hand, the gross operating rate of the broad construction sector[7], which gives an indication of the sector's profitability, decreased marginally from 22.6% in 2010 to 22.1% in 2015.

In parallel, construction costs have gone up steadily over the past decade (Figure 8). Compared to 2010, they have grrement in labour costs (+13.9%) over 2010-2016, and by an increase in input prices for materials (+8.7%).

Figure 6: Construction cost index for residential buildings over 2000-2016 (2010=100)



Source: Eurostat, 2017.

Employment

The number of **people employed** in the broad construction sector in Germany has been increasing considerably since 2010, growing from 2,938,001 to 3,835,612 in 2016 (+30.6%). This represents 8.35% of all employment in the general economy. The narrow construction sub-sector accounted for 62.4% of the total sector workforce in 2016, followed by architectural and engineering activities (15.2%) (Figure 9). Employment increased in all sub-sectors except for real estate over 2010-2016, led by narrow construction (+46.0%), followed by architectural and engineering activities (+31.7%) and manufacturing (+5.1%). In the real estate sub-sector, following substantial growth in 2014 to 615,000 (up by 20.1% compared to 2013), there was a 33.7% decrease in the employed persons in 2015 (407,928), mainly due to a 50% drop in the persons employed in the Renting and operating of own or leased real estate. As result, over 2010-2016, the number of persons employed in the real estate sub-sector decreased by -4.5%. In terms of **specific professions**, narrow construction showed a substantial increase in the persons employed in the development of building projects as well as in persons employed in the construction of other civil engineering projects over 2008-2015.

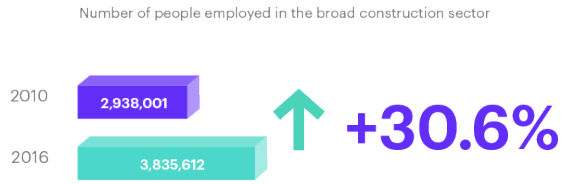
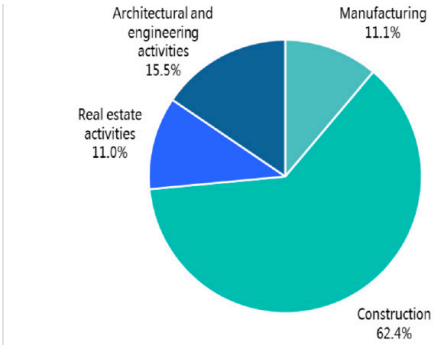


Figure 7: Percentage of people employed by construction sub-sectors in Germany in 2016

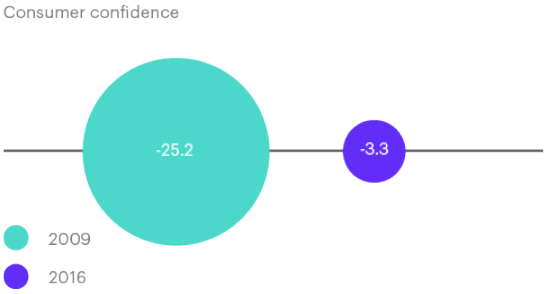


Source: Eurostat, 2017.

Following a peak in 2012-2014 (471,000)in 2016 the number of **self-employed** people in the narrow construction sector stood at 442,000, which represents a 1.2% decrease from the number in 2010. Self-employed persons in the construction industry account for 11.8% of all self-employed people in the general economy. Self-employment in the real estate sector in 2016 also decreased compared to 2010 (-22.7%) to 41,000 persons, which represents 1.1% of the self-employed persons in the general economy. Micro, small and medium companies employed 89.8% of the total workforce of the broad construction sector in 2015, therefore constituting the largest employer.

Business confidence

Overall business confidence in the German economy is slightly negative, but it improved considerably since the low point of the global economic crisis. Indeed, the **consumer confidence** indicator stood at -25.2 in 2009 and improved to -3.3 in 2016, showing the high sensitivity of consumption to changes in the market. **Industry confidence** fluctuated strongly being down at -33 in 2009, moving up to 14.2 in 2011, but then re-entering negative territory amounting to 2.1 in 2016. The **construction confidence index** fared, on average, worse compared to the other indices. It was down at -28.7 in 2009, climbed up to -5.2 in 2013, worsened again in 2014-2015 and reached its highest level in 2016 at -0.2. Nevertheless, the Central Association of the German Construction Industry (Zentralverband Deutsches Baugewerbe) looks at the industry with confidence for 2017 forecasting a 5% increase in turnover[8].



In parallel, the **investment ratio** slightly increased from 19.9% in 2015 to 20.0% in 2016, almost comparable to the peak in 2011 (20.1%), demonstrating a positive business confidence in the economy. **Investment per worker**, on the other hand, stood at EUR 92,700 in 2015, a decrease of 12.3% compared to 2010.

Domestic sales

The ranking of the **most domestically sold construction products** remained constant in Germany between 2010 and 2016, with the exception of 'Prefabricated wooden buildings' that replaced 'Portland cement'. Overall, sales for the most domestically sold products increased over this period, however sales for 'Other structures and parts of structures' went down by 40.9%. Conversely, sales for 'Prefabricated wooden buildings' increased by 41.8%. The top 5 most domestically sold construction products, both in Germany and in the EU, are presented in Table 3. Together, these made up 49.5% of all German construction products sales in 2016.

Table 4: 5 most exported construction products in Germany and in the EU in 2016

Germany			EU-28
Product	Value (EUR m)	Share in construction product domestic sales (%)	Product
Other structures, etc. (group 251123)	5,061	16.7	Other structures (group 251123)
Doors, windows, etc. (group 251210)	3,455	11.4	Doors, windows, etc. (group 251210)
Ready-mixed concrete (group 236310)	2,530	8.4	Ready-mixed concrete (group 236310)
Windows, French windows and their frames (group 162311)	1,982	6.6	Prefabricated buildings of metal (group 251110)
Prefabricated wooden buildings (group 162320)	1,932	6.4	Windows, French windows and their frames (group 162311)

Source: PRODCOM, 2017.

Export of construction-related products and services

Table 4 presents the **top 5 most exported construction products**, both in Germany and in the EU. These accounted for 52.8% of all construction exports from Germany in 2016. Overall, the value of exports of the five most exported products in 2016 fell in comparison to their exports in 2010, with exports of 'Other structures', 'Portland cement' and 'Builders' joinery and carpentry', dropping by 33.3%, 8.0% and 0.7%, respectively. Conversely, the values of the exports of "Doors, windows etc." and "Windows, French windows and their frames" increased by 21.8% and 69.7%, respectively.

Table 3: 5 most domestically sold construction products in Germany and in the EU in 2015

Germany			EU-28
Product	Value (EUR m)	Share in construction product domestic sales (%)	Product
Other structures, etc. (group 251123)	165.0	28.2	Ceramic tiles and flags (group 233110)
Doors, windows, etc. (group 251210)	75.6	9.3	Other structures (group 251123)
Windows, French windows and their frames, doors and their frames and thresholds, of wood (group 162311)	66.8	5.2	Marble, etc. (group 237011)
Portland cement, aluminous cement (group 235112)	65.4	5.2	Prefabricated buildings of metal (251110)
Builders' joinery and carpentry, of wood, n.e.c. (group 162319)	55.9	4.9	Builders' joinery and carpentry, of wood, n.e.c. (group 162319)

Source: PRODCOM, 2017.

As for the cross-border provision of construction services, Germany exported EUR 1.9 billion worldwide in 2015, 6.5% less than the previous year. Specifically, 63.2% of exports (EUR 1.2 billion) were made to the EU-28, marking a stable trend compared to the previous year.

Conversely, the value of exports to countries outside the EU-28 experienced a 7.6% decline, from EUR 774 million in 201 to EUR 715 million in 2015. In parallel, Germany **imported** a total of **EUR 1.5 billion** in construction services in 2015, a 2.1 % decrease since 2014. Overall, Germany generated a trade surplus of EUR 421 million.

Access to finance in the construction sector

With the onset of the financial crisis and the ensuing stricter capital requirements for banks, the construction industry faced greater challenges in financing business operations. Indeed, after peaking 63.2 billion in 2009, **lending to the narrow construction sector** decreased by 6.8% until 2013. It subsequently recovered reaching again 2009 levels at EUR 63.2 billion in 2016.

Despite the worsening of financing conditions in the wake of the financial crisis, the dependency of construction businesses on bank finance is not excessive, considering that construction companies often finance their operations with payments in advance or instalment payments[9]. Indeed, in 2016 the overall financing conditions for German construction businesses are considered relatively positive with low indebtedness of the sector. Furthermore, banks are on average no less willing to provide credit construction businesses compared to other sectors[10].

Access to housing

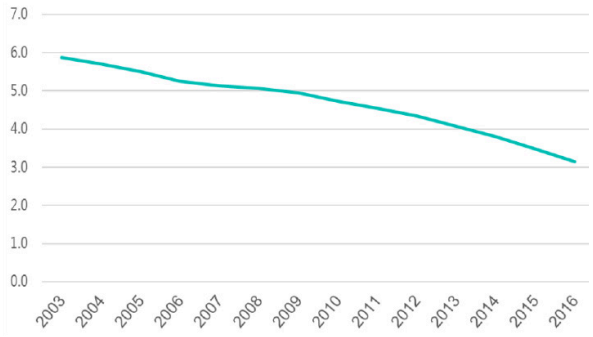
> More than a third of the German population (35.5%) was reported to live in cities in 2015, a 1.6% increase from 2010.

Moreover, the **number of households** reached 40.5 million in 2016, perpetuating the increasing trend since 2000. This, as well as the recent positive migration to the country, is stimulating the demand for new residential construction. Indeed, it is estimated that 3.6 million migrants will have arrived to Germany until 2020, requiring annually at least 350,000 new dwellings[11]. Furthermore, the increase in the mean annual equivalised net income to EUR 23,499 in 2015 (+11.4% since 2008) is also a positive driver for the sector.

The number of approved permits for dwellings in 2015 reached 375,589, double the number of permits issued in 2010. Of these, 84% were new residential buildings and 2% non-residential buildings. Renovations of currently existing dwellings requiring construction permits accounted for the remaining 14%[12].

A further the driving forces behind the positive development in residential construction is the sharp decline in **interest rates**, from 4.7% in 2010 to 3.1% in 2016, making mortgages more affordable and investments in residential construction more attractive (Figure 10). Indeed, total **outstanding residential loans** amounted to 1.3 billion in 2015, which represents an increase by 11.7% from 2008.

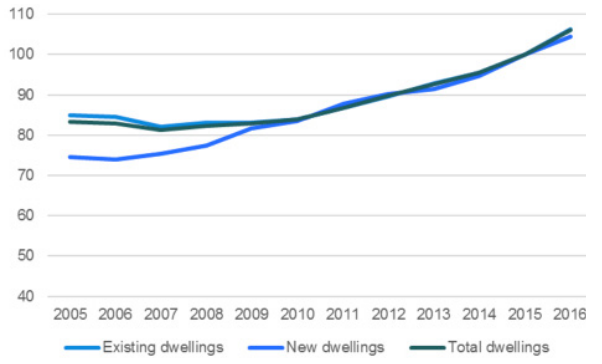
Figure 8: Mortgage rates for loans for over 5 years original maturity (%)



Source: ECB MFI Interest Rate Statistics, 2017.

However, very low interest rates coupled with rising incomes have raised concerns from the German Central Bank about a potential overheating of the market. Indeed, property prices are rising quickly, in particular in big cities, making it more difficult for middle class households to afford housing. After a low in 2007, house prices have been continuously on the rise and growth picked up particularly since 2011 (Figure 11). According to the Bundesbank, flats and houses in 127 German cities in 2016 were 15 to 30% more expensive than could be justified by the fundamental factors such as rent. The year before, this overvaluation was estimated to be 10 to 20 per cent. The price rise has been driven by low interest rates and cheap credit[13].

Figure 9: House price index in Germany over 2010-2016 (2010=100)

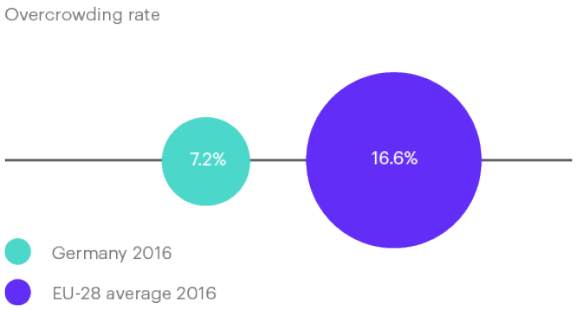


Source: Eurostat, 2017.

Despite the fact that investment in housing is becoming an increasingly interesting option and pushing up house prices, the German housing market is still characterised by a low rate of **home ownership** and a preference for rental housing. In 2015, 51.9% of the building stock was held by homeowners, while 48.1% was in the hands of tenants. Nevertheless, the likelihood of being home owner or tenant depends to a considerable extent on income. Indeed, only 24.5% of people earning below 60% median equivalised income own their

home, while this figure reaches 57.3% for people earning above 60% of the median equivalised income.

The housing quality in Germany is relatively high. For instance, the **overcrowding rate** at 7.2% in 2016 compares well with the EU average of 16.6%. Furthermore, **severe housing deprivation** affects only 1.9% of the population, while this figure reaches 4.9% in the EU28. On the other hand, **housing cost overburden** is an increasing challenge, impacting 15.8% of the population compared to 11.1% in the EU. In response to this, Germany's social housing policy is increasingly providing assistance in the form of benefits, such as allowances and payments of heating costs[14].



Infrastructure

> According to the 2016-2017 Global Competitiveness Report, Germany ranks 8th internationally for the quality of its infrastructure, scoring higher than average for advanced economies[15].

Namely, it performs well in terms of the available airline seat km/week, being ranked 6th in the world. It also scores highly for the quality of its railroad infrastructure (11th) and port infrastructure (11th). Moreover, the quality of its roads at 13th place compares well to most economies worldwide. Germany is advanced in terms of timely completion of the Trans-European Transport Network (TEN-T), which is completed for inland waterways and has a completion rate of 60% for rail and road[16].

4

Key issues and barriers in the construction sector

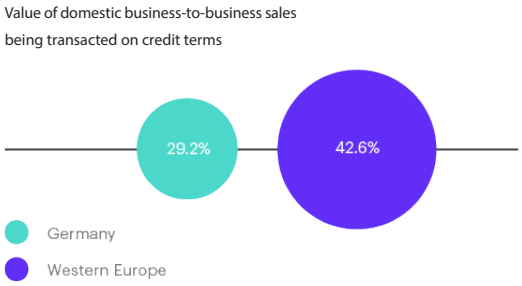
Company failure

Generally, the business demography within the German broad construction sector has been declining between 2009 and 2014, with both the number of company births and the number of company deaths going down. This trend is particularly pronounced in the real estate sub-sector, where **company births** dropped by 43.0% to 12,349 over 2009-2014[17]. At the same time, **company deaths** decreased by 53.3% reaching 10,272. For narrow construction, the number of company births stood at 25,076 in 2014, 8.7% lower than in 2009. Company deaths at 27,355 were also 6.0% lower than in 2014. Architectural and engineering activities saw a similar development with company births declining by 22.8% to 8,261 and company deaths going down by 16.0% to 11,467.

Insolvencies in the construction sector have been declining over the past years, due to improving profit margins and higher demand. This trend is expected to continue into 2017[18]. Indeed, according to the data by the German Construction Federation (*Hauptverband der Deutschen Bauindustrie*), insolvencies at 1,556 reached an all-time low in 2016, down by 31.5% compared to the peak in 2009[19].

Trade credit

Trade credit in the German economy is not as widespread as in other countries, with only about 29.2 % of the **value of domestic business-to-business sales** being transacted on credit terms (compared to an average of 42.6% in Western Europe)[20]. This highlights the general risk-averse approach to trade credit, possibly due to the increase in late payments over the past couple of years (see Late payment). This aversion to selling on credit is even more pronounced when selling to foreign buyers – only 23.9% of B2B transactions to foreign customers in 2017 were on credit, in line with the general trend among Western European countries to offer trade credit to domestic B2B customers more often than to foreign B2B customers.



Late payment

> According to the European Payment Report 2016, Germany ranks above average of European countries assessed in terms of its payment practices, presenting good payment stability and a low risk payment profile[21].

Despite the positive assessment in terms of payment risk, **late payments** have high negative consequences according to 68% of surveyed businesses. On average, payment terms in B2B transactions in 2017 were set at 24 days - Germany offered the shortest payment terms in the region. This underlines a very strong emphasis on swift invoice payment[22].

The German construction sector reports one of the highest shares of payments performed by due date in 2016, with 85.0% of total payments made by due date, second only to the finance services sector, where 86.0% of all payments are on time. 14.3% of payments in the construction sector are carried out with a delay of up to 30 days, and just 0.7% of payments occur with delays of over 30 days[23].

The transposition of the Late Payment Directive (2011/7/EU) in 2014 was welcomed by stakeholders, notably the Central Association of the German Construction Industry, as it is expected that the new provisions will further improve payment culture in the construction industry[24].

Time and cost of obtaining building permits and licenses

> The World Bank ranked Germany 12th in 2016 for "Dealing with construction permits".

Building a warehouse requires **8 administrative procedures** (well below the OECD high-income average of 12.1) and takes 96 days (considerably below the 152.1 average) (Table 5)[25]. The estimated cost is approximately 1.1% of the warehouse value, lower than the OECD high-income average of 1.6%. In particular, **obtaining a building permit** takes 25 days and costs EUR 6,642. Once a building is completed, it takes 1 day to receive inspection (free of charge). Requesting, receiving inspection and obtaining water connection requires a total of 47 days, at a total cost of EUR 7,500.

Table 5: Construction procedures timing and costs in Germany

Procedure	Time to complete	Associated costs
Obtain building permit	25 days	EUR 6,642
Apply for approval of static calculation	21 days	EUR 3,586
Receive fire safety inspection from District Chimney Sweeper	1 day	EUR 31
Receive inspection of the building shell	1 day	EUR 2,600
Receive inspection after completion of the building ("Foermliche Bauabnahme")	1 day	No charge
Apply for water connection)	1 day	EUR 7,500
Receive inspection by water company	1 day	no charge
Obtain water connection	45 days	No charge

Source: Doing Business overview for Germany, World Bank, 2017.

Skills shortage

The number of **job vacancies** in the construction sub-sector increased by 18.8% between 2011 and 2015, from 61,001 to 72,484. Vacancies in the real estate sub-sector grew even more strongly over the same period (+62.2%) albeit from a much lower level, namely from 2,947 to 4,780. As a result, the job vacancy rate increased for both sub-sector, indicating greater difficulties in filling vacant positions. In parallel, **adult participation rate in education and training** in the construction sub-sector slightly decreased, from 9.4% in 2010 to 8.9% in 2016. Conversely, in the real estate subsector, adult participation in training went up slightly from 11.0% in 2010 to 11.1% in 2016. The number of **tertiary students in engineering, manufacturing and construction**, and specifically in architecture and building, increased by 37.6% over 2010 to 2015, from 16,301to 22,437.

The number of job vacancies evolution 2011-2015 ↑ **18.8%**

With increasing demand for construction works, the industry is faced with the need to find adequate skills on the market, particularly for high skilled professions such as engineering. Indeed, bottleneck vacancies for civil engineers, building electricians and similar professions are typically hard to fill due to the lack of technical competencies in the workforce[26]. Furthermore, demographic changes constitute a particular threat for the German construction sector, creating difficulties in filling the increasing number of vacancies originating from the growing proportion of retiring construction workers. In 2016, 10,784 new construction apprenticeship contracts were signed, compared to the 13,500 workers that retired in the same year. The ratio of apprentices to skilled workers was 8.7 in 2014, below the critical value of 10, evidencing an unmet demand for skilled workers, particularly in enterprises with fewer than 100 employees[27].

Indeed, the lack of qualified skills is hampering the sector with two-thirds of construction companies are experiencing issues in finding suitable staff[28]. While there has been a shortage of skilled workers and specialists in professions such as plumbing, plumbing, heating and air-conditioning technology as well as in the finishing trades for some time now, since summer 2017 there has also been a shortage in building construction and civil engineering[29]. The **share of non-German nationals** in the workforce of the construction industry has increased from 7.7% (2008) to 14.3% (2016)[30]. Given the important shortage of skilled professionals, foreign (non-EU) workers with relevant recognised vocational qualifications have been allowed to be employed in the German construction sector, as of July 2013[31].

In addition, the influx of migrants constitutes a further pool of potential labour for the construction sector. However, migrants often lack necessary language skills and need to be provided with the necessary education before being employable - in 2016, the share of workers with refugee status in the construction sector corresponded to only 0.2% of the workforce[33].

Data on **posted workers** for 2015 shows that workers posted in the construction sector accounted 44.5% of all workers posted to Germany from the EU. For comparison purposes, 41.6% of all postings in the EU are in the construction sector.

Sector & sub-sector specific issues

Material efficiency and waste management

In 2015 over 209.0 million tonnes of **construction and demolition (C&D) waste** were generated in Germany, representing 52% of all waste generated[34].

In 2015 over 209.0 million tonnes of **construction and demolition (C&D) waste** were generated in Germany, representing 52% of all waste generated[35]. According to the 2015 Monitoring Report, 175.1 million tonnes of C&D waste were treated in an environmentally friendly way, reaching a total **recovery rate** of C&D waste of 89.0%[36]. This is well above the 70% target for 2020 set by the EU Waste Framework Directive.

However, regions such as Baden-Württemberg are currently experiencing a shortage of landfill capacity. As a result, waste disposal costs have doubled over the past few years, and some landfills have closed or stopped accepting waste outside of their immediate surroundings, often forcing construction companies to transport their waste to other landfills farther away[37]. This has led to the so-called "Waste tourism" (Mülltourismus), which places an additional burden on the environment and on road traffic. Germany's construction industry association (Landesvereinigung Bauwirtschaft) therefore stresses the importance of the identification and opening of new landfills to improve the management of contaminated C&D waste, which cannot be recycled. Nevertheless, this process may take up to ten years[38].

In terms of legal framework for waste management, there are considerable variations among Germany's 16 Länder, which have key responsibilities over waste management. At national level, the Ministry for Environment, Nature Conservation, Building and Nuclear Safety (BMUB) opened the discussion with the federal states on its proposed overarching legal framework on substitute building materials, landfill and soil protection (the so-called Mantelverordnung or MantelV)[39], but the adoption of the legislation has stalled[40]. Still at national level, the initiative Circular Economy Bau (Kreislaufwirtschaft Bau) fosters the circular economy by regularly publishing monitoring reports and bringing together key construction stakeholders[41].

The EU Construction & Demolition Waste Management Protocol adopted in 2016 introduces non-binding guidelines as a proposal to the construction industry with the aim to increase confidence in the Construction and Demolition waste management process and the trust in the quality of Construction and Demolition recycled materials.

Climate and energy

Emissions of greenhouse gases (carbon monoxide and dioxide, methane, nitrous oxides and particulate matter) from activities in the construction and real estate sub-sectors amounted to 9.9 million tonnes and 0.9 million tonnes in 2014, respectively. The former increased by 7.0% since 2008, whereas the latter decreased by 15.0%.

5

Innovation in the construction sector

Innovation performance

With an overall innovation and R&D expenditure performance well above the EU average, Germany is classified as an **Innovation leader**, according to the European Innovation Scoreboard 2017[42].

With an overall innovation and R&D expenditure performance well above the EU average, Germany is classified as an **Innovation leader**, according to the European Innovation Scoreboard 2017[43]. Germany's performance between 2010 and 2016 declined by 3.7%, following a positive growth until 2013, but a decrease ever since. Nevertheless, it remains the best performing country in terms of Firm Investments and has improved its performance on indicators related to Human resources, Research system attractiveness and Innovation-friendly environment. However, performance declined in the dimension Innovators, related to SME innovation, Intellectual assets and Employment and Sales impacts.

In line with the country's strong innovation performance, the **business enterprise R&D expenditure** (BERD) for the broad construction sector, displayed a positive trend across all sub-sectors between 2009 and 2014 (Figure 12). Indeed, BERD expenditure in the construction and real estate sub-sectors amounted to EUR 80.0 million and EUR 0.7 million in 2014, respectively. In particular, R&D expenditure in the construction sub-sector has increased by 43.9% since 2008 (at EUR 55.6 million). Similarly, R&D expenditure in the real estate sub-sector has grown by 17% since 2009 (at EUR 0.6 million), but is still minimal. Conversely, companies in the professional and technical activities sub-sector, such as engineering and architecture, displayed the highest level of investment in R&D, close to EUR 1.4 billion in 2014. However, compared to the peak in 2011 BERD in professional and scientific activities declined by 10.4%.

Figure 9: Business enterprise R&D expenditure (BERD) per construction sub-sector in Germany over 2009-2014 (EUR)

Source: Eurostat, 2017.

The total number of R&D personnel (full-time equivalents – FTE) in the construction sub-sector was 1,062 in 2014, i.e. 65.9% higher than the pre-crisis level (640)[44].

The number of FTE in the real estate sub-sector also increased since 2009 (+9.1%), but is still marginal (12 in 2014), in line with the sub-sector's low BERD expenditure. The professional and technical activities sub-sector reported the largest number of R&D personnel, with a 69.5% increase in FTE, from 7,516 in 2008 to 12,740 in 2014.

According to the 2017 EU Industrial R&D Investment Scoreboard, 7 Germany companies in the construction and materials industry and 3 enterprises in real estate investment & services are ranked among the top 1,000 by R&D spending[45].

However, analysis innovation in construction sector SMEs shows a marked decline over time. In 2013-2015, just 13% of all SMEs in the sector engaged in innovation, compared to 25% in the pre-crisis years (2006-2008)[46].

A number of policy measures aim at promoting innovation in the construction sector.

In 2006, the Federal Ministry for Environment, Nature Conservation, Building (BMUB) and Nuclear Safety in collaboration with Fraunhofer IRB launched the '**Future of Building**' (*Zukunft Bau*) research initiative which focuses on solutions related to climate change, mobility as well as demographic change, with the aim to strengthen the competitiveness of the German construction industry and, in particular, to expand knowledge and insights in the area of technical, architectural and organizational innovations[47]. Since the founding of the initiative, more than 1,000 research projects have already been funded with almost EUR 115 million in federal funding. In 2017, EUR 11 million euros were made available for grant applications[48].

In 2016, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety introduced **Reform Bundesbau** – its strategy for improvements in the costs, timeliness and quality of construction in federal buildings, which includes a set of measures, meant to address noted deficiencies with public sector construction projects.

Eco-innovation and digitalisation

The Federal Ministry of Economics and Technology is promoting an array of construction research projects as part of the **Energy-Optimised Construction (EnOB) initiative**[49], which in 2014 was allocated a budget of EUR 23.7 million[50]. The EnOB comprises five research areas, as follows:

- **EnBau** (Energy-Optimised New Buildings): it entails the planning and construction of office, administration, public and commercial buildings with minimal energy requirements.
- **EnSan** (Energy-Oriented Refurbishment): involves the testing of innovative refurbishment technologies and materials.
- **EnBop** (Energy-Oriented Operation Optimisation): entails the optimisation of the performance of both traditional and innovative non-residential buildings through the development of innovative tools and services.
- **LowEx** (Low-Exergy Technologies): focuses on the development of innovative systems for buildings and energy supply, also using renewable sources (e.g. solar energy).
- **ViBau** (Vacuum Insulation in the Building Trade): involves the development of highly efficient vacuum insulation panels (VIP) and their integration in construction products, among others.

Moreover, the Federal Ministry of Education and Research is granting institutional funding of about EUR 232 million per year to Karlsruhe Institute of Technology for research projects including the development and marketing of **Celitement®** (granted EUR 4.3 million)[51]. The energy consumption of this environmentally sustainable cement is expected to be half of that of traditional Portland cement[52]. The Karlsruhe Institute of Technology further launched an innovation project related to 'prevention in construction', which focuses on long-term maintenance of key infrastructure. The project has a 5-year budget of EUR 1.8 million[53].

Furthermore, the **digitalisation** of the construction sector stimulates innovation. The Federal Ministry of Transport and Digital Infrastructure supports the use and uptake of Building Information Management (BIM) for the whole supply chain of planning, construction and operation. Besides sponsoring pilot-projects, a national step plan for the BIM implementation was presented in 2015[54]. It provides that BIM will be introduced by 2020 as the new standard for transport infrastructure projects. Similar plans are scheduled for other public works. In addition to efforts by the public authorities, an industry alliance called "planen und bauen 4.0 GmbH" supports the digitisation of the construction sector[55].

In 2017, the Ministry of Construction, Ministry of Economics and representatives of the construction, architecture and, engineering industry associations launched industry dialogue under the heading "Digital construction" (Digitaler Hochbau), which aims to strengthen the networking of the players in the construction value chain and initiate solutions for digital transformation process in the planning and construction sectors[56].

6

National & Regional Policy & Regulatory Framework

Policy schemes

The Ministry for Economic Affairs and Energy, Federal Ministry for Environment, Nature Conservation Building and Nuclear Safety and the Federal Ministry of Transport and Digital Industry are the main actors shaping the construction sector at the country level. The **Energiewende** is Germany's largest post-war infrastructure project influencing also heavily the construction sector through investment in energy infrastructure, research and new regulations for new and existing buildings aiming to improve energy efficiency. The ambitious goal is to reduce the heating requirements of the building stock, in order to achieve a nearly carbon neutral building stock by 2050 (see TO 3 - Resource efficiency / Sustainable construction). About 220 billion euros were invested from 2000 to 2014 in renewable energy (in all sectors) In the decade to come, investment in the energy sector is expected to reach about 15 billion euros annually, including 9-10 billion euros invested in new renewable energy capacity[57].

In terms of **housing policies**, since 2006, the implementation of **social housing programmes** is entirely the responsibility of the Länder, and hence varies considerably in focus and siz[58]. Apart from this, the Länder also lead different local policy activities, like vocational trainings or regional financing schemes that have an impact on the construction sector.

In addition to policies at regional level, the federal state also implements out a number of measures aimed at alleviating housing costs and lack of housing. Indeed, in 2016 the BMUB introduced the so-called **Housing Construction Campaign** (*Wohnbauoffensive*) - a comprehensive package of measures aimed at tackling housing shortages and rising house prices. The policy aims to increase the annual stock of completed dwelling from 270,000 completed dwellings to at least 350,000 dwellings a year by removing barriers and providing incentives at all federal levels[59]. A 2017 review of the progress of the package showed early success in the implementation of measures related to increasing the Federal Compensation Fund for Social Housing (*Kompensationsmittel des Bundes für den sozialen Wohnungsbau*), revision of the land sale and allocation rules, setting up necessary bodies to simplify construction standards, and increasing awareness and acceptance of the the project among the citizens[60]. This initiative was concluded together with the **Alliance for Affordable Housing and Building**, a cooperation launched by the BMUB in 2014 bringing together key construction stakeholders to address the challenge of rising house prices.

> Furthermore, Germany has a longstanding practice of providing a housing allowance to low income people in order to support the payment of rent.

Furthermore, Germany has a longstanding practice of providing a housing allowance to low income people in order to support the payment of rent. This policy is enshrined in the **Law on Housing Allowance** (*Wohngeldgesetz*). The amount of the allowance was increased in 2016 and ranges from approximately EUR 300 to EUR 1,000 depending on the size of the household, the cost of the rent and the overall household income[61].

Housing cooperatives play an important role in providing social housing and affordable rents. Such cooperatives are eligible for funding from the 1.5 billion Federal Compensation Fund for Social Housing[62].

Finally, the Government supports the adaptation of residential buildings through the programme "Rebuilding according to age" (*Altersgerecht Umbauen*), running from 2009 to 2011, with a yearly budget of EUR 80-100 million. The programme was reintroduced in a loan form (2012) and grant variant (2014), funded by the public development bank *Kreditanstalt für Wiederaufbau* (KfW). The programme helped to finance 700,000 barrier-free apartments, which represents about 2% of the apartment stock. Nevertheless, the demand for such housing is estimated at 2.9 million by 2030 due to demographic developments[63].

Insurance and liability related regulations

The legal and regulatory rules are defined partly at the federal level and to a large degree by the individual Länder. The **Civil Code** (BGB – *Bürgerliches Gesetzbuch*) sets out the main provisions with regard to liability in tort (such as injuries inflicted to third parties, breach of statutory provisions and liability for damages caused by agents or sub-contractors) and liability of construction parties (such as architects, engineers, building contractors) for construction defects[64].

The regular limitation period set in the Civil Code is three years, but a limitation period of two years is defined for construction related to manufacture, maintenance or alteration of a moveable asset, and of five years for construction related to works whose result consists in the

manufacture, maintenance or alteration of a building[65].

2017 saw the adoption of the Construction Contract Law as part of the Civil Code, effective as of 1 January 2018. The new law includes significant changes improving the rights of building owners and developers, for example by entitling them to a comprehensive description of the construction works to be undertaken prior to a conclusion of the contract, as well as a fixed timeframe for completion of the works, which can become the basis for damages claims in case of delays. The law also introduces a cancellation period of 14 day for contracts not validated by a notary, as well as termination provisions in case of bankruptcy of the contractor. Customers can also withhold 10% of the payment as a last instalment as guarantee for satisfactory completion of turnkey projects. The law also includes provisions advantageous to construction firms, such as the definition of an acceptance test, after which the customer cannot claim defects in the performed works. Furthermore, construction sector chambers with experts specializing in construction law should be available in future in order to decide on open questions quickly and competently[66]. The new law has been welcomed by industry associations[67].

In terms of insurance, the contractor can obtain the liability insurance (*Haftpflichtversicherung*), or the all risks insurance (*Bauleistungsversicherung*) for works in progress, which includes coverage for damage and theft. The advance building insurance (*Gebäudeversicherung*) also covers natural disasters[68].

Building regulations

The responsibility for public construction law in Germany is also divided between federal and state governments. Zoning law (*Bauplanungsrecht*) falls under federal law. It determines the purpose for which a property may be used and whether a building project fits into its surroundings. The federal states are responsible for building regulations (Bauordnungsrecht), which determines how buildings may be designed and constructed in order to meet planning law requirements[69]. The *Musterbauordnung* (Model Building Code) at Federal level offers a prototype for each state to issue its own building regulation. In order to obtain a building permit (*Baugenehmigung*), the project must comply with planning and building regulations[70], as well as with all other relevant regulations. For instance, the Energy Performance Certificate (EnEV-*Ausweis*) is mandatory to obtain a building permit, according to the *Energieeinspargesetz and Energieeinsparverordnung* (Energy Saving Act and Energy Saving Ordinance).

The legal framework can be complemented by federal contracting rules, such as the **Standard Rules of Contracting and Execution of Construction Works** (*Vergabe und Vertragsordnung fur Bauleistungen* - VOB). These are compulsory for the procurement of public works but are also frequently used in private construction projects. Furthermore, contractual provisions also define the liability relationship between parties in a construction project. The rights of consumers purchasing a property from a developer are protected by the **Makler– und Bautragerverordnung** (MaBV) law, which sets, among others, the maximum proportion of the purchase price to be paid by the customer during the development stages of the property. If life is put in danger through failure to observe acknowledged rules during design, supervision or execution of works, the **German Penal Code** (*Strafgesetzbuch,* STGB) may apply.

Each state issues a list of acknowledged technical rules for works (Liste der Technische Baubestimmungen), with reference to standards of the German Institute for Standardisation (*Deutsches Institut für Normung,* DIN) for the planning, design and building of construction works and their parts. DIBt (*Deutsches Institut für Bautechnik*) is responsible for the development of the list on behalf of the Länder[71]. Therewith, the German DIN standards have official status and are mandatory for building projects and for the production of building products, building elements and construction systems.

7

Current Status & National Strategy to meet Construction 2020 Objectives

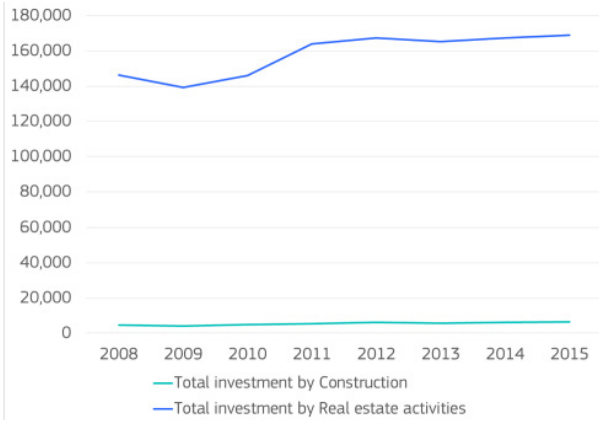
TO 1 - Investment conditions and volumes

Total **investment by the broad construction sector**[72] increased substantially over the past years (Figure 13), signalling the rebound of the industry. Notably, investment by narrow construction increased by 39.4% and by real estate by 15.6%, respectively, over 2008-2015. In absolute terms, investment by real estate activities stood at EUR 169 billion in 2015, while investment by the construction sub-sector at EUR 6.5 billion. On the other hand, investment in intellectual property by the broad construction industry followed a mixed trend, increasing by 4.5% for narrow construction, but decreasing by 3.6% for real estate activities.

Investment by narrow construction evolution 2008-2015 ↑ **39.4%**

investment by real esate evolution 2008-2015 ↑ **15.6%**

Figure 11: Investment by the German broad construction industry between 2008-2015 (EUR m)

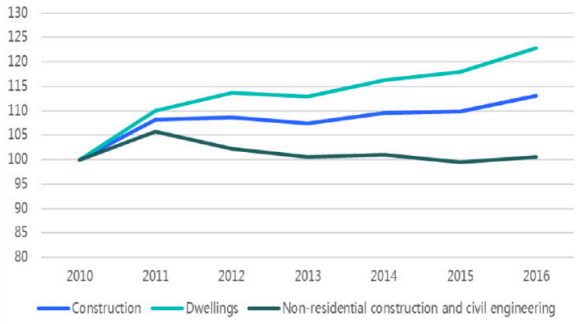


Source: Eurostat, 2017.

Total **investment in construction**[73] increased by 13.1% over 2010-2016 (Figure 14), with investment in dwellings experiencing important growth starting in 2011 and being 22.9% higher compared to 2010. In contrast, investment in non-residential construction and civil engineering remained relatively stagnant over the same period and in 2016 was just 0.5% higher than in 2010. In absolute terms, investment in the construction sector totalled EUR 295 billion in 2015, out of which EUR 178 billion were invested in dwellings and EUR 117 billion were devoted to non-residential construction and civil engineering[74].

Total investment in construction, evolution 2010-2016 ↓ **13.1%**

Figure 12: Investment in the German construction sector between 2010-2016 (2010=100)



Source: AMECO, 2017.

Total inland infrastructure investment as a share of GDP remained relatively constant at 0.6% over 2010-2014, with the exception of 2009, where it increased to 0.7%.

Annual investment in rail infrastructure went up by 24.8% in 2015 compared to 2010, and by 4.0% and 3.2% in the case of road infrastructure and inland waterways infrastructure. Conversely, annual investment in air and sea went down in 2015 compared to 2010, by 42.6% and 52.33% respectively.

However, Germany has been suffering from severe underfinancing and insufficient maintenance of public infrastructure, coupled with very low investments through Public Private Partnerships (PPPs) and overall relatively low public investment. This has negatively affected the overall quality of the public building stock, according to the German Construction Industry Association (*Hauptverband der Deutschen Bauindustrie*).

Although public investment increased strongly in 2015-2016, the public investment-to-GDP ratio has remained largely constant in recent years (2.2 % of GDP in 2016) and is still relatively low compared with the euro area (2.8 % of GDP without Germany), despite a downward euro area trend since 2009[75].

Nevertheless, the investment backlog at municipal level has decreased from 2015 (EUR 136 billion) to EUR 126 billion in 2016, whereby road and traffic infrastructure account for the largest share of the gap (27 %). In 2016, municipalities reported a positive fiscal balance of EUR 5.4 billion and increased investment expenditure of EUR 25.8 billion[76].

This comes on the back of measures introduced by the federal government to strengthen its own investment spending as well as that of the federal states and municipalities amounting to an average of about EUR 8.5 billion of investment or 0.3 % of GDP annually over the period 2016-2018. One such measure is the municipal investment promotion fund of **EUR 7 billion** which was set up for 2015-2020 as part of the **Municipal Investment Promotion Act** to boost spending on the maintenance, repair and conversion of local infrastructure and the rehabilitation of schools[77]. By mid-2017, 87% of the funding available for infrastructure investment has been committed to more than 10,000 different investment projects[78]. In parallel, the federal government is reforming federal fiscal relations in order to facilitate investment at municipal level, addressing in particular bottlenecks in implementing transport infrastructure. The reform will come into effect in 2020[79].

Regarding transport infrastructure, the federal government has planned to increase the amount of investment from the current EUR 10.8 billion, to EUR 13 billion in 2017. The **2030 Federal Transport Infrastructure Plan** (*Bundesverkehrswegeplan* (BVWP)), adopted in 2016, sets the strategy for transport investment in Germany, highlighting the importance assigned by the federal government and the EU to mobility and infrastructural investments in Germany[80]. Some of the planned investments will be carried out as PPP projects, in line with the 11 "new generation" transport infrastructure PPPs announced by the Ministry of Transport and Digital Infrastructure in 2015.

A number of important transport infrastructure projects in Germany are carried out as PPPs. For instance, the renovation and expansion of the A7 motorway, which is a key component of the trans-European road network (TEN-T), has been initiated through a PPP between the government and a private contractor, for a total cost of EUR 600 million[81]. The project is also being supported by the European Investment Bank (EIB) with EUR 170 million, under the **European Project Bond Initiative**[82]. The EIB has also recently granted a **EUR 160 million** loan to finance the construction of a section of the A94 motorway in Bavaria, which will be built through a PPP between the region and a consortium of private contractors[83]. However, the experience with PPP projects has highlighted the risks associated with this financing model and construction industry stakeholders have called on the government to reconsider its use in motorway projects[84].

In addition to investment in infrastructure, the shortage of residential dwellings in Germany is addressed through housing programmes. The federal government contributes **EUR 1 billion** annually between 2016 – 2019 to social housing projects supporting families, students, pensioners and refugees. To deal with the current refugee crisis, the KfW already made EUR 1 billion available for communes setting up housing for refugees in 2015. The urban development assistance programme **Social City** is another example of the successful collaboration of actors at the federal and Länder level. It focuses on stabilising and upgrading economically and socially deprived urban areas. Until the end of 2016, 782 measures in 441 cities and communities were included in the programme. For 2017, EUR 190 million of funding are available, which represents and important increase from 2015[85].

Renovation spending by households accounted for EUR 10.7 billion in 2015, which represents and increase by 13.0% since 2008. Energy-related expenditure features prominently among investments in existing dwellings. Indeed, in 2015 EUR 36.4 billion (28%) were dedicated to this purpose, however this is slightly lower than the figure in 2010, namely EUR 38.6 billion (32%)[86].

Renovation spending by households evolution 2008-2015 ↑ 13.0%

Finally, a significant portion of **EU Funds** are spent on infrastructure in Germany. Specifically, the planned allocation of Community Funding for 2014-2020 on transport amounts to EUR 555 million[87]. Furthermore, under the Connecting Europe Facility EUR 1.9 billion worth of projects have been signed by 2016, while nine projects in the area of transport have been signed/approved for financing from the European Structural and Investment Fund (EFSI) managed by the EIB[88].

TO 2 – Skills

> Germany has a strong tradition of dual training, which is reflected in high participation rates to its dual vocational education and training (VET) system and overall employment rates for graduates.

Indeed, 86.4% of students are enrolled in VET programmes that include in-company and school-based learning. This significantly above the EU average of 27%[89]. In 2015 the employment rate for graduates with medium-level qualifications (ISCED 2-4) stood at 88% in contrast to the EU average of 77.2%.

Despite boasting a wide range of advanced dual training programmes, skills shortage is one of the biggest problems for the German construction industry, both in the short- and long-term.

In 2013, the construction industry in Germany launched the "**Berufsstart Bau**" pilot project, which financially supports measures for training in the construction industry. Under the project, regional measures are being set up in around 200 cross-company training centers throughout Germany in cooperation with local construction companies. The inter-company training centers bring in experience, know-how and existing contacts. For the period 2013-2015, 365 trainees completed the training successfully, with 70% taking on employment afterwards[90]. The funding period for the pilot project has been extended until 31.08.2018[91].

Some Länder set up campaigns aimed at raising interest in the construction sector among young students. An instance is the youth campaign "**BAU – Dein Ding**" (Construction – your thing), initially launched in Baden-Württemberg in 2012 and operated by the local construction industry association[92]. The initiative aims to inspire local students to explore construction-related professions through a variety of materials, including the "Construction Bus" (*BauBus*), visiting students directly at school. The programme was then adopted by other regions such as North Rhine-Westphalia, which started it in December 2015[93].

At regional level, Berlin-Brandenburg launched the initiative **'Ready for Apprenticeship'** (*Startklar für Ausbildung*) to offset the lack young talent. The programme started in 2013 and runs until 2018 with an approximate annual budget of EUR 365,000. The main goal of the initiative is to reduce the skills mismatch by helping young unemployed to discover a range of construction-related professions. It is designed as a 6-month training scheme that facilitates the transition into a construction profession. The programme has supported 55 trainees in obtaining an apprenticeship since its start .

"**Deutschland Baut!**" (Germany builds!) is a further initiative implemented in 2013 by an association of private companies across the entire construction value-chain. It aims to enhance the image of the construction sector and create a network to facilitate cooperation among industry stakeholders, with the ultimate goal of mitigating the shortage of qualified workers by attracting and upskilling young people. In November 2015, the association launched an 18-month trainee programme enabling technical/engineering graduates to gain first-hand experience within adhering construction companies[95].

To stimulate interest for the construction sector by young people, the Construction Federation of Nordrhine (*Baugewerbeverband Westfalen*) launched the so-called **Azubi Portal**, which provides key information on apprenticeships in the construction industry. It allows interested candidates to submit their application directly through the portal[96].

Finally, the recent influx of migrants provides an opportunity to recruit workers and to facilitate their integration. In this respect, the pilot project "*Arrivo Bauwirtschaft*" run by the City of Berlin aims at coaching asylum seekers to be fit for regular professional training[97].

TO 3 - Resource efficiency / Sustainable construction

Since the political push to decarbonise the economy (*Energiewende*), Germany made substantial efforts to make its , given that buildings make up approximately 35% of energy consumption and thus have important energy savings potential[98]. Notably, through the "**2050 Energy Concept**", the federal government has paved the way to the transformation of the country's energy supply and utilisation. The Concept foresees, among other targets, the reduction of the primary energy demand of buildings by 80% by 2050, compared to 2008[99]. Furthermore, the annual rate of energy retrofits for buildings is to be doubled from the current 1% to 2% of the existing building stock[100].

In this context, **Energy Efficiency Strategy for Buildings** of the Federal Ministry for Economic Affairs and Energy, adopted in 2015, integrates electricity, heat and efficiency aspects, setting a comprehensive framework of measures. The **Energy Saving Act and Energy Saving Ordinance** (*Energieeinsparverordnung* – EnEV) implement the goals of the Energy Concept and Energy Efficiency Strategy and transpose the EU Directive on the energy performance of building (2010/21/EU)[101]. The Energy Saving Act was amended through the Fourth Act in 2013, which introduces the obligation for new buildings to be constructed as nearly zero-energy buildings. The Energy Savings Ordinance introduced in May 2014 increases energy efficiency standards by 20-25% starting in 2016[102]. In parallel, the **Renewable Energies Heat Act** sets the obligation to use renewable energies in new buildings, aiming to increase their share in the heat sector to 14% by 2020[103].

In addition to the current legislative framework for energy efficiency in buildings, the German government introduced the **Green Paper on**

Energy Efficiency in 2016 as a starting point for a reflection on how to further boost energy efficiency, including in the building stock. Along with the Green Paper, a consultation process with stakeholders was initiated involving an online consultation, the creation of an Energy Efficiency and Buildings Platform as well as regional events organised by the Ministry of Economic Affairs and Energy[104].

In 2017, the Ministry of Economic Affairs and Energy presented a new energy audit tool - the '**tailored renovation roadmap**' (*individuelle Sanierungsfahrplan*) is a software-based tool that serves to provide an overview of the modernisation work a particular building will require over time. The roadmap is key to the ministry's efforts to implement the government's Energy Efficiency Strategy for Buildings[105].

So-called '**Building check**' and '**Heating Check**' are on-site consulting services that offer practical recommendations on how to reduce energy consumption. Finally, the information portal **Deutschland macht's effizient** (www.machts-effizient.de) provides information and advice on all topics related to energy efficiency. A free hotline is also available for questions[106].

Furthermore, a number of programmes provide financial support for the transition aimed at enhancing energy efficiency in buildings. Indeed, over the period from 2006 to 2016, 4.6 million dwellings have either been refurbished or constructed as energy-efficient by design[107]. For instance, the **Market Incentive Programme** (MAP) with a yearly budget of **EUR 300 million**, offers grants and low-interest loans to private individuals, companies and municipalities to invest in sustainable heating and cooling technologies powered by renewable energy.

> The Energy Efficiency Incentive Programme aims to expand the support available to the building sector to boost investment in energy efficiency renovation of homes.

Measures include investment grants for fuel-cell heating systems, as well as awareness campaigns and advisory services for homeowners[108]. The **Heating Optimisation Funding Programme** launched in 2016 gives financial support for optimising the heating system, such as the installation of high-efficiency pumps. The programme covers up to 30% of optimisation expenses for a maximum amount of EUR 25,000[109].

As one of the largest and best-known support schemes for sustainable buildings in Europe, the **KfW programmes** are playing an important role in meeting the energy targets. For instance, the **Energy-efficient Refurbishment programme** covers 30% of the cost for energy-efficient renovation of a building. Home owners, businesses as well as municipalities are eligible for the KfW low-interest loans and grants. Since 2016, the KfW programme was updated and now also covers support to heating and ventilation. The KfW funding contributed very significantly to improving energy efficiency in buildings, as approximately one out of three retrofits benefited from it[110].

Furthermore, the federal government has earmarked EUR 150 million for the new research initiative "**Solar-powered Buildings/Energy-efficient Cities**" in the context of its Energy Research Programme. The projects will be funded for a period of up to five years, with the first call for proposals launched in 2016. In addition, the "**EnEff.Gebäude.2050** – Innovative projects for achieving nearly climate-neutral building stock by 2050" funding initiative, also launched in 2016, is available for exemplary innovation and transformation projects in the building sector that can contribute to the removal of barriers on the path towards a virtually climate-neutral building stock[111].

Further support for the promotion of energy efficiency in construction comes from the **Guidelines for Sustainable Construction** (*Leitfaden für Nachhaltiges Bauen*), which were made compulsory by the Federal Ministry of Transport, Building and Urban Affairs for federal buildings in 2013. The specify a number of criteria for sustainable building construction, includinging ecological quality, economic quality, socio-cultural and functional quality, technical quality and process quality, which i.a. address matters of energy efficiency, resource efficiency and waste prevention. The Assessment System for Sustainable Building complements the guidelines and can result in the award of a **Sustainable Building Certificate**.

Germany's 2017 **National Energy Efficiency Action Plan (NEEAP)** reaffirms the country commitment to reaching the targets provided in the Energy Efficiency Directive and highlights many of the measures listed in this section as the main means of implementing its long-term strategy for mobilising investment in the renovation of the national building stock pursuant to Article 4 of the Energy Efficiency Directive. The estimated energy savings in buildings per year are estimated at 685.9 petajoules in 2016 compared to the baseline year of 2007[112].

TO 4 - Single Market

Competition on the German construction market has become tougher over the last decade, particularly following the EU enlargement. According to the Central Association of the German Construction Industry, one of the reasons for this is the fact that foreign firms are allowed by EU law to operate for several months under the social security system of their country of origin, even when securing contracts in other Member States[113]. This has led to a considerable difference in labour costs between the German and Eastern European workforce, making Eastern European companies more competitive than German ones.

On the other hand, there are still some barriers preventing the German construction market from aligning fully to the principles of the Single Market, creating problems for EU companies wishing to secure contracts in Germany. For instance, Germany shows an average performance regarding public procurement, yet with an unsatisfactory score for 'reporting problems' indicating that information on procurement provided by public buyers is little or low quality. This means

that less public procurement opportunities are advertised at EU level. Furthermore, Germany is the Member State with the highest number of pending infringement proceedings related to Single Market legislation in 2016, with a high number of infringements in the area of free movement of goods and market surveillance, road and rail transport and indirect taxation[114].

One of the recent infringement cases in the area of free movement was specifically in the construction sector. In 2014, the Court of Justice of the EU ruled that the national technical approval system (Construction Products Lists - *Bauregellisten*), requiring construction products to be tested further, even if they are already CE-marked, in order to obtain a national conformity mark (*Ü-Zeichen*), was in breach of the principle of free movement of goods within the EU Single Market and violated the provisions of the Construction Products Regulation (305/2011/EU)[115]. To comply with the judgement, the Model Building Code (*Musterbauordnung*) was amended in 2016, lifting the requirement for CE-marked construction products to obtain national proof of fitness for use and conformity proofs and eliminating the Ü-Zeichen as of October 2016. As a result, the Länder are in the process of updating their own Building Codes accordingly[116]. This is a step forward towards the harmonisation of construction legislations and consolidation of the Single Market, according to EU associations such as the European Producers of Laminate Flooring (EPLF)[117]. On the contrary, German associations are concerned about an ensuing decline in the quality of construction products[118] and about the uncertainty arising from the legislative changes[119].

With respect to the use of Eurocodes, Germany published all Eurocodes Parts as National Standards with the exception of EN 1990-A1 (Annex 2). The Regulation MLTB 03/2014 mandates 39 Eurocodes Parts for structural design. Other National Standards are used in parallel with EN 1991-4 (DIN FB 140), EN 1995-1- 1 (DIN 1052-10), and with EN 1997-1 (DIN 1054). The National Standards complement the Eurocodes Parts. Ssome Eurocodes Parts are restricted according to the Regulation MLTB 03/2014. There is no particular obligation to make use of Eurocodes in public procurement[120].

TO 5 - International competitiveness

Germany ranked 5th globally in the 2016-2017 Global Competitiveness Index in terms of the competitiveness of its economy, maintaining its positioning compared to the previous 2014-2015 period[121].

Germany ranked 5th globally in the 2016-2017 Global Competitiveness Index in terms of the competitiveness of its economy, maintaining its positioning compared to the previous 2014-2015 period[122]. The most problematic factors for doing business include unfavourable tax rates and regulations, inefficient government bureaucracy, an inadequately educated workforce as well as restrictive labour regulations. However, Germany scores well in terms of business sophistication and innovation potential. Indeed, the critical importance of the German export economy is highlighted in the recently launched **Strategy Paper** 'New impulses for international competitiveness and major strategic projects – opportunities for Germany'[123].

Despite the large size of its construction sector and the overall competitiveness of German engineering, only one single German company ranked within the top 50 European construction firms in 2016 by sales, comparable to Switzerland or Norway, but well behind countries like the UK, boasting 13 companies within the ranking[124]. Nevertheless, due to its renowned engineering expertise, the German construction industry has also been increasingly successful in securing international contracts, particularly for infrastructure and civil engineering projects. On the other hand, several issues have been reportedly limiting opportunities for German construction businesses wishing to operate across the EU, particularly linked to public procurement.

Public procurement procedures to secure tenders in other EU countries are often deemed too expensive and complex, since companies have to comply with technical and administrative requirements to which they are not accustomed. These challenges have resulted in construction firms being discouraged and relinquishing their participation in EU tenders. This was the case for a German company initially tendering for a road construction project in Poland, which subsequently decided not to enter the EU public procurement process again due to the higher costs and administrative burden incurred[125].

In 2016, the international volume of turnover for German construction firms totalled **EUR 24.8 billion**, 89% of which came from outside of the EU[126]. However, the total value of acquired orders received from abroad has experienced a 20.0% decrease from its all-time high level in 2010of EUR 34.0 billion to **EUR 27.2 billion** in 2016[127]. The peak is 2010 suggests that German construction companies have turned to foreign markets during the height of the crisis to compensate for the unfavourable domestic economic climate. Currently, the presence of the German construction sector spans over 70 countries across all continents, with the dominance of North America and Australia increasing over that of Europe and Asia. Its share of international construction revenue amounted to 5.0% in 2016, down from 6.5% in 2014[128].

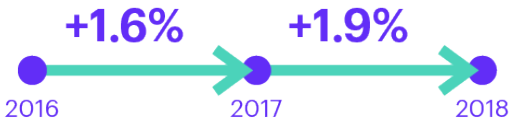
Finally, the wider Central and Eastern Europe markets (including Ukraine, Turkey and Russia) represents important growth opportunities for German construction companies. To better take advantage of these opportunities, the German Construction Industry Federation developed a Central and Eastern Europe Portal, which includes relevant market and construction related information for each country[129].

8
Outlook

The outlook for the German economy continues to be solid with GPD growth predicted at 1.6% in 2017 and 1.9% in 2018, driven by export and investments, including government spending in the construction sector in terms of housing and infrastructure[130].

The outlook for the German economy continues to be solid with GPD growth predicted at 1.6% in 2017 and 1.9% in 2018, driven by export and investments, including government spending in the construction sector in terms of housing and infrastructure[131]. Therefore, the outlook for the construction sector is strong, fuelled by a booming housing market, which already marked a 9% growth rate in turnover in 2016. The industry's expectations are positive for all market segments, predicting an overall turnover growth of 4% in 2018[132]. The German construction sector has not suffered from the crisis as much as its European counterparts have. On the contrary, it has experienced an increase in productivity and employment, driven primarily by investments in construction of residential properties.

GDP growth prediction



The number of workers employed in the broad construction sector is projected to increase by 13.82% in 2018 relative to 2016, reaching 4.4 million people. Similarly, the number of enterprises in the broad construction sector is forecast to grow by 14.0% in 2018 relative to 2016, reaching 742,000. The value added of the broad construction sector is also expected to experience a substantial growth, being projected to rise by 13.4% in 2018 compared to 2016, reaching EUR 264.860 billion.

Number of workers employed in the broad construction sector prediction 2016-2018

↑ 13.82%

The main driver of the construction industry will continue to be the residential segment, which is expected to grow by 3.5% in turnover in 2018. Despite the reduced influx of refugees during 2016, demand for housing remains strong. The industry expects that approximately 310,000-320,000 new building units will be constructed in 2017, while demand is estimated at 350,000 units per year. However, according to the Central Association of German Construction Companies a hampering factor of housing construction are the restrictions on housing credit implemented by the Regulation on residential property credit (*Wohnimmobilienkreditrichtlinie*) that went into force in 2016, which were assessed to have a negative impact on banks' issuance of housing credit[133]. Amendments to the regulation introduced in 2017, however, are expected to ensure that the law does not create additional hurdles in lending to young families, low income earners and senior citizens[134].

Demand for non-residential construction is expected to be stable, driven in particular by construction of factories and other industrial buildings. The turnover of this segment is thus predicted to increase by 4% in 2018[135].

The longstanding concerns regarding the low levels of infrastructure spending and gradual deterioration of German infrastructure (TO 1 - Investment conditions and volumes), have resulted in government action. The positive budget balances at the end of 2017 are expected to open up investment at federal, regional and municipal level. The municipalities would also benefit from the Municipal Investment Fund, whose term has been extended until 2020 and whose volume has been doubled to 7 billion euros. A turnover increase of 4% is predicted for the public works segment[136].

The main challenge for the continued growth of the sector is to be found in current and expected skills shortages. Finally, local and regional authorities need to work out ways to secure long-term investment capacity[137].

References

1 Please note that the share of each sub-sector in the value added of the broad construction sector should not be compared to the shares of the Gross Value Added in the GDP, since the GDP also includes taxes and excludes subsidies.

2 Eurostat, Unemployment by sex and age - annual average http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=une_rt_a&lang=en

3 European Commission, Country Report Germany 2017, February 2017, https://ec.europa.eu/info/sites/info/files/2017-european-semester-country-report-germany-en.pdf

4 European Commission, Country Report Germany 2017, February 2017, https://ec.europa.eu/info/sites/info/files/2017-european-semester-country-report-germany-en.pdf

5 European Commission, Country Report Germany 2017, February 2017, https://ec.europa.eu/info/sites/info/files/2017-european-semester-country-report-germany-en.pdf

6 Federal Ministry of Environment, Nature protection, Construction and Nuclear Safety, Förderprogramm "Altersgerecht Umbauen". February 2015. http://www.bmub.bund.de/themen/stadt-wohnen/wohnraumfoerderung/altersgerecht-wohnen/foerderprogramm-altersgerecht-umbauen/

7 The gross operating rate is the ratio of Gross Operating Surplus to Turnover, and is an indicator of profitability.

8 Zentralverband des Deutschen Baugewerbes, Große Zuversicht für 2017: Umsatzwachstum von 5 % erwartet, January 2017, http://www.zdb.de/zdb-cms.nsf/id/grosse-zuversicht-fuer-2017-umsatzwachstum-von-5-erwartet-de?open&ccm=040

9 Atradius, Market Monitor Construction Germany 2017, February 2017, https://group.atradius.com/publications/market-monitor-construction-germany-2017.html

10 Ibidem.

11 Roland Berger, Bauwirtschaft im Wandel, Trends und Potenziale bis 2020. April 2016, https://www.rolandberger.com/publications/publication_pdf/roland_berger_hvb_studie_bauwirtschaft_20160415_1_.pdf

12 Deutsche Bauindustrie, Genehmigungen im Wohnungsbau. http://www.bauindustrie.de/zahlen-fakten/bauwirtschaft-im-zahlenbild/genehmigungen-im-wohnungsbau/

13 Financial Times, German residential property prices on the rise, November 2017. https://www.ft.com/content/7ac2e8fe-d4db-11e7-8c9a-d9c0a5c8d5c9

14 Housing Europe, The State of Housing in the EU 2015, http://www.housingeurope.eu/resource-468/the-state-of-housing-in-the-eu-2015

15 World Economic Forum, The Global Competitiveness Report 2016–2017. http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

16 European Commission, EU Transport Scoreboard 2016. https://ec.europa.eu/transport/sites/transport/files/de_en.pdf

17 No data is available after 2014.

18 Atradius, Market Monitor Construction Germany 2017, February 2017, https://group.atradius.com/publications/market-monitor-construction-germany-2017.html

19 Hauptverband der Deutschen Bauindustrie, Facts and Charts in English, http://www.bauindustrie.de/media/documents/internet__englisch.xlsx

20 Atradius, Payment Practices Barometer Germany. April 2017. https://atradiuscollections.com/global/reports/payment-practices-barometer-germany-2017.html

21 Intrum Justitia, European Payment Report 2016. https://www.intrum.com/globalassets/countries/norway/documents/2016/european-payment-report-europa-2016.pdf

22 Atradius, Payment Practices Barometer Germany. April 2017. https://atradiuscollections.com/global/reports/payment-practices-barometer-germany-2017.html

23 CRIBIS D&B, Payment Study 2017. https://www.dnb.ru/media/entry/54/Payment_Study_2017_Light.pdf

24 Zentralverband Deutsches Baugewerbe, Deutsche Bauwirtschaft begrüßt Verabschiedung des Gesetzes gegen Zahlungsverzug http://www.zdb.de/zdb-cms.nsf/id/deutsche-bauwirtschaft-begruesst-verabschiedung-des-gesetzes-gegen-zahlungsverzug--de

25 World Bank Group, Doing Business 2017, Ease of Doing Business in Germany. http://www.doingbusiness.org/data/exploreeconomies/germany#dealing-with-construction-permits

26 Ramboll, Bottleneck Vacancies in Germany, 2014. http://ec.europa.eu/social/BlobServlet?docId=12648&langId=en

27 Deutsche Bauindustrie, Bedarf an Facharbeitern nicht mehr gedeckt. http://www.bauindustrie.de/zahlen-fakten/bauwirtschaft-im-zahlenbild/ausbildung-der-bauwirtschaft/

28 Verzögerungen am Bau als Folge vom Fachkräftemangel. November 2015. http://www.meistertipp.de/aktuelles/news/verzoegerungen-am-bau-als-folge-vom-fachkraeftemangel

29 Bundesagentur für Arbeit Statistik/ Arbeitsmarktberichterstattung, Fachkräfteengpassanalyse, December 2017. https://statistik.arbeitsagentur.de/Statischer-Content/Arbeitsmarktberichte/Fachkraeftebedarf-Stellen/Fachkraefte/BA-FK-Engpassanalyse-2017-12.pdf

30 Bauindustrie, Bauwirtschaft im Zahlenbild 2017 https://www.bauindustrie.de/media/documents/BW_Zahlenbild_2017_final.pdf

31 Federal Ministry for Economic Affairs and Energy – Make it in Germany. In demand: Experts with vocational qualifications. http://www.make-it-in-germany.com/en/for-qualified-

professionals/working/demanded-professions/needed-vocational-qualifications

32 Meistertipp, Fachkräftemangel belastet die Bauwirtschaft, July 2016. http://www.meistertipp.de/aktuelles/news/fachkraeftemangel-belastet-die-bauwirtschaft

33 Die Welt, Personalengpass am Bau bleibt trotz Zuwanderunghttps, December 2017. http://www.welt.de/wirtschaft/article171195557/Personalengpass-am-Bau-bleibt-trotz-Zuwanderung.html

34 Statistisches Bundesamt, Abfallaufkommen in Deutschland stagniert. June 2017. https://www.destatis.de/DE/PresseService/Presse/Pressemitteilungen/2017/06/PD17_196_321.html

35 Statistisches Bundesamt, Abfallaufkommen in Deutschland stagniert. June 2017. https://www.destatis.de/DE/PresseService/Presse/Pressemitteilungen/2017/06/PD17_196_321.html

36 Destatis – Statistisches Budesamt, Waste balance 2013. https://www.destatis.de/EN/FactsFigures/NationalEconomyEnvironment/Environment/EnvironmentalSurveys/WasteManagement/Tables/TablesWasteBalanceOverview.html

37 Bauwirtschaft Baden-Württemberg, Deponieknappheit: Wohin mit nicht wiederverwertbaren Baumassenabfällen?. November 2015. http://bauwirtschaft-bw.de/2015/11/30/Deponieknappheit-Wohin_mit_nicht_wiederverwertbaren_Baumassenabfaellen/6171,11

38 Ibidem.

39 Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), Mantelverordnung Ersatzbaustoffe/Bodenschutz, February 2017. http://www.bmub.bund.de/themen/wasser-abfall-boden/bodenschutz-und-altlasten/wasser-bodenschutz-und-altlasten-download/artikel/mantelverordnung-ersatzbaustoffebodenschutz/?tx_ttnews%5BbackPid%5D=668

40 Deutsche Handwerks Zeitung, Bauschutt: Deponien am Limit. October 2017. https://www.deutsche-handwerks-zeitung.de/bauschutt-zu-viel-landet-auf-den-deponien/150/3095/333528

41 Deloitte, Construction and Demolition Waste management in Germany, September 2015. http://ec.europa.eu/environment/waste/studies/deliverables/CDW_Germany_Factsheet_Final.pdf

42 European Commission, Innovation Union Scoreboard 2016. EU http://iri.jrc.ec.europa.eu/documents/10180/1030082/The%202016%20EU%20Industrial%20R%26D%20Investment%20Scoreboard

43 European Commission, Innovation Union Scoreboard 2016. EU http://iri.jrc.ec.europa.eu/documents/10180/1030082/The%202016%20EU%20Industrial%20R%26D%20Investment%20Scoreboard

44 No data is available after 2014.

45 European Commission, The 2017 EU Industrial R&D Investment Scoreboard, http://iri.jrc.ec.europa.eu/scoreboard17.html

46 KFW, KfW-Innovationsbericht Mittelstand 2016, April 2017. https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Innovationsbericht/KfW-Innovationsbericht-Mittelstand-2016.pdf

47 Federal Ministry for Education and Research. Bundesbericht Forschung und Innovation 2014. https://www.bundesregierung.de/Content/DE/_Anlagen/2014/05/2014-05-21-bericht-forschung-innovation.pdf?__blob=publicationFile&v=1

48 Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Hendricks fördert Forschungsprojekte im Bauwesen mit 11 Millionen Euro. August 2017. https://www.bmub.bund.de/pressemitteilung/hendricks-foerdert-forschungsprojekte-im-bauwesen-mit-11-millionen-euro/

49 EnOB, http://www.enob.info/en/research-areas/

50 Bundesministerium für Wirtschaft und Energie (BMWi), Bundesbericht Energieforschung 2015. April 2015. https://www.bmwi.de/BMWi/Redaktion/PDF/Publikationen/bundesbericht-energieforschung,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf

51 Karlsruhe Institute of Technology (KIT), Official Start of the Celitement Pilot Plant. October 2011. https://www.kit.edu/kit/english/pi_2011_8219.php

52 Ibidem.

53 Karlsruher Institut für Technologie (KIT), Infrastruktur – Vorbeugen ist besser als Heilen, May 2015. https://www.kit.edu/kit/19846.php

54 Bundesministerium for Verkehr und digitale Infrastruktur, Stufenplan Digitales Planen und Bauen, 2015. http://www.bmvi.de/SharedDocs/DE/Publikationen/DG/stufenplan-digitales-bauen.pdf?__blob=publicationFile

55 Planen bauen 4.0, http://planen-bauen40.de/

56 Federal Ministry of Environment, Nature protection, Construction Building and Nuclear Safety, Bauministerium und Wirtschaftsministerium initiieren den Branchendialog "Digitaler Hochbau", September 2017. https://www.bmub.bund.de/pressemitteilung/bauministerium-und-wirtschaftsministerium-initiieren-den-branchendialog-digitaler-hochbau/

57 Agora Energiewende, Understanding the Energiewende - FAQ on the ongoing transition of the German power system, October 2015. https://www.agora-energiewende.de/fileadmin/Projekte/2015/Understanding_the_EW/Agora_Understanding_the_Energiewende.pdf

58 Housing Europe, Social housing in Europe: Germany http://www.housingeurope.eu/resource-107/social-housing-in-europe

59 Federal Ministry of Environment, Nature protection, Construction Building and Nuclear Safety, Bundesbauministerin Hendricks wirbt für eine Fortsetzung der Bündnisarbeit nach der Bundestagswahl, June 2016. https://www.bmub.bund.de/pressemitteilung/hendricks-buendnis-fuer-bezahlbares-wohnen-und-bauen-ist-ein-erfolgsmodell/

60 Federal Ministry of Environment, Nature protection, Construction Building and Nuclear Safety, Bericht des Expertengremiums zum Umsetzungsstand der Wohnungsbau-Offensive, July 2017. http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Wohnungswirtschaft/umsetzungsstand_wohnungsbau-offensive_bf.pdf

61 Federal Ministry of Environment, Nature protection, Building and Nuclear Safety, Wohngeld - ein Zuschuss zur Miete oder zur Belastung, http://www.bmub.bund.de/themen/stadt-wohnen/wohnraumfoerderung/wohngeld/

62 Federal Ministry of Environment, Nature protection, Building and Nuclear Safety, November 2016, http://www.bmub.bund.de/presse/pressemitteilungen/pm/

artikel/wohnungsgenossenschaften-stehen-fuer-bezahlbare-mieten-und-schaffen-neuen-wohnraum/?tx_ttnews%5BbackPid%5D=3001

63 Federal Ministry of Environment, Nature protection, Construction and Nuclear Safety, Förderprogramm "Altersgerecht Umbauen". http://www.bmub.bund.de/themen/stadt-wohnen/wohnraumfoerderung/altersgerecht-wohnen/foerderprogramm-altersgerecht-umbauen/

64 European Commission, Liability and insurance regimes in the construction sector: national schemes and guidelines to stimulate innovation and sustainability. April 2010 http://www.elios-ec.eu/sites/default/files/pdf/Eliosspecialreporton27MemberStates.pdf

65 DLA Piper, Germany, Limitation Period, http://www.dlapiperrealworld.com/law/index.html?t=construction&s=liability&q=limitation-period&c=DE

66 FAZ, Mehr Rechte fürs Bauen. January 2018. http://www.faz.net/aktuell/wirtschaft/wohnen/neues-gesetz-was-steht-im-neuen-bauvertragsrecht-15408747.html

67 Bauindustrie zur Einigung im Bauvertragsrecht, February 2017. https://www.bauindustrie.de/presse/presseinformationen/bauindustrie-zur-einigung-im-bauvertragsrecht/

68 DLA Piper, Germany, Insurances, http://www.dlapiperrealworld.com/law/index.html?t=construction&s=forms-of-contract-procurement-methods&q=insurances&c=DE

69 Germany Trade & Invest, http://www.gtai.de/GTAI/Navigation/EN/Invest/Investment-guide/The-legal-framework/planning-and-building,t=construction-laws,did=6832.html

70 Germany Trade & Invest, http://www.gtai.de/GTAI/Navigation/EN/Invest/Investment-guide/The-legal-framework/planning-and-building,t=building-permits,did=6834.html

71 Deutsches Institut für Bautechnik (DIBt), https://www.dibt.de/.

72 This includes total investment by the construction and real estate sub-sectors, defined as gross fixed capital formation, i.e. acquisitions minus disposal, of total fixed assets (e.g. machinery and equipment, vehicles, dwellings and other buildings).

73 This includes total investment (i.e. gross fixed capital formation) in dwellings and non-residential construction and civil engineering by investors in the general economy (e.g. industry, financial and non-financial services, households, agricultural sector, etc.).

74 The indicator gross fixed capital formation in non-residential and civil engineering refers to the Eurostat indicator «Other buildings and structures»

75 European Commission, Country Report Germany 2017, February 2017. https://ec.europa.eu/info/file/96680/download_en?token=nd9QIBAW

76 KfW, KfW Municipal Panel 2017. May 2017. https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-Kommunalpanel/KfW-Kommunalpanel-2017_KF_EN.pdf

77 Bundesministerium der Finanzen, Förderung von Investitionen finanzschwacher Kommunen, January 2018. http://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Foederale_Finanzbeziehungen/Kommunalfinanzen/Kommunalinvestitionsfoerderungsfonds/Foerderung-von-Investitionen-finanzschwacher-Kommunen.html

78 Bundesministerium der Finanzen, Umsetzung des Kapitel 1 des Kommunalinvestitionsförderungsgesetzes (KInvFG I) in den Ländern, January 2018. http://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Oeffentliche_Finanzen/Foederale_Finanzbeziehungen/Kommunalfinanzen/Kommunalinvestitionsfoerderungsfonds/Umsetzung-KInvFG.pdf?__blob=publicationFile&v=6

79 European Commission, Country Report Germany 2017, February 2017. https://ec.europa.eu/info/file/96680/download_en?token=nd9QIBAW

80 Federal Ministry of Transport and Digital Infrastructure, The 2030 Federal Transport Infrastructure Plan, August 2016, http://www.bmvi.de/SharedDocs/EN/Documents/G/ftip-2030.pdf?__blob=publicationFile

81 Die Welt, Gabriels Masterplan für die marode Bundesrepublik. February 2015. http://www.welt.de/wirtschaft/article137496860/Gabriels-Masterplan-fuer-die-marode-Bundesrepublik.html

82 European Investment Bank, A7 extension: first financing operation in Germany with EU project bonds. August 2014. http://www.eib.org/infocentre/press/releases/all/2014/2014-182-a7-extension-first-financing-operation-in-germany-with-eu-project-bonds.htm

83 European Investment Bank, EIB supports construction of key road in Bavaria with long-term loan. January 2016. http://www.eib.org/infocentre/press/releases/all/2016/2016-014-eib-supports-construction-of-key-road-in-bavaria-with-long-term-loan.htm?media=rss&language=de

84 Zentralverband Deutsches Baugewerbe, Baugewerbe: Verzicht auf ÖPP im Autobahnbau zwingend geboten!, August 2017. https://www.zdb.de/zdb-cms.nsf/id/oepp-insolvenz-a1-de?open&ccm=

85 Federal Ministry of Environment, Nature protection, Construction and Nuclear Safety, Soziale Stadt, http://www.bmub.bund.de/themen/stadt-wohnen/staedtebau-foerderung/soziale-stadt-biwaq/soziale-stadt/

86 European Commission, Country Report Germany 2017, February 2017. https://ec.europa.eu/info/file/96680/download_en?token=nd9QIBAW

87 European Commission, EU Transport Scoreboard 2016, https://ec.europa.eu/transport/sites/transport/files/de_en.pdf

88 EIB, EFSI Project List, http://www.eib.org/efsi/efsi-projects/index?c=DE

89 European Commission, Education and Training Monitor 2016, Germany, https://ec.europa.eu/education/sites/education/files/monitor2016-de_en.pdf

90 Aktuelle Zahlen Berufsstart Bau. http://www.bauwirtschaft-rlp.de/images/content/Rundschreiben/2017/A2_06-17_Anlage.pdf

91 SOKA Bau, Pilotprojekt „Berufsstart Bau". https://www.soka-bau.de/arbeitgeber/leistungen/berufsausbildung/berufsstart-bau/

92 Bauwirtschaft Baden-Wruttenberg, Bau - Dein Ding!. http://bauwirtschaft-bw.de/verband/leistungen/beratungsleistungen/nachwuchsmarketing/bau-dein_ding

93 Deutsche Bauindustrie Nordrhein-Westfalen, START DER NACHWUCHSKAMPAGNE „BAU–DEIN–DING" IM DEZEMBER 2015. http://www.bauindustrie-nrw.de/start-der-nachwuchskampagne-bau-dein-ding-im-dezember-2015/

94 European Commission, European Construction Sector Observatory, Policy measure fact sheet, Germany, Startklar für Ausbildung, March 2015. http://ec.europa.eu/DocsRoom/documents/20533/attachments/3/translations

95 Saint-Gobain, DEUTSCHLAND BAUT! STARTET MIT VIELVERSPRECHENDEM TRAINEEPROGRAMM - DIE INITIATIVE FREUT SICH ÜBER GROSSE RESONANZ BEI HOCHSCHULABSOLVENTEN.

October 2015. http://www.sgbd-deutschland.de/presse/detail/?tx_ttnews%5Btt_news%5D=173&cHash=1aaf89b0c60bdd3b7284aab6b4ab889f

96 Azubiportal, http://www.azubi-bau.de/

97 Meistertipp, Fachkräftemangel belastet die Bauwirtschaft, July 2016, http://www.meistertipp.de/aktuelles/news/fachkraeftemangel-belastet-die-bauwirtschaft

98 Federal Ministry for Economic Affairs and Energy, Gebäude energieeffizienter machen, https://www.bmwi.de/Redaktion/DE/Dossier/energiewende-im-gebaeudebereich.html;jsessionid=EC90D19E565C2E868BBA55136E9D7091

99 Federal Ministry for Economic Affairs and Energy, Energy Efficiency Strategy for Buildings. http://www.bmwi.de/EN/Topics/Energy/Buildings/energy-efficiency-strategy-for-buildings.html

100 Federal Ministry for Economic Affairs and Energy, Germany's new energy policy. April 2012. http://www.bmwi.de/English/Redaktion/Pdf/germanys-new-energy-policy

101 Federal Ministry for Economic Affairs and Energy, Energy Saving Legislation. http://www.bmwi.de/EN/Topics/Energy/Buildings/energy-saving-legislation.html

102 Federal Ministry for Economic Affairs and Energy, Energy Saving Legislation. https://www.bmwi.de/Redaktion/DE/Artikel/Energie/gebaeude-energieeinsparrecht.html

103 Federal Ministry for Economic Affairs and Energy, Erneuerbare-Energien-Wärmegesetz http://www.erneuerbare-energien.de/EE/Navigation/DE/Recht-Politik/Das_EEWaermeG/das_eewaermeg.html

104 Federal Ministry for Economic Affairs and Energy, Green Paper on Energy Efficiency, https://www.bmwi.de/Redaktion/EN/Publikationen/green-paper-on-energy-efficiency.pdf?__blob=publicationFile&v=3

105 Federal Ministry of Economic Affairs and Energy. Ministry presents new energy audit tool: the tailored renovation roadmap, May 2017. https://www.bmwi.de/Redaktion/EN/Pressemitteilungen/2017/20170504-bmwi-stellt-neues-instrument-der-energieberatung-vor.html

106 Federal Ministry for Economic Affairs and Energy, Enhancing energy efficiency in buildings, https://www.bmwi.de/Redaktion/EN/Dossier/enhancing-energy-efficiency-in-buildings.html

107 Federal Ministry for Economic Affairs and Energy, Enhancing energy efficiency in buildings, https://www.bmwi.de/Redaktion/EN/Dossier/enhancing-energy-efficiency-in-buildings.html

108 Federal Ministry for Economic Affairs and Energy, Energy Efficiency Incentive Programme. http://www.bmwi.de/EN/Topics/Energy/Buildings/energy-efficiency-incentive-programme.html

109 Federal Ministry for Economic Affairs and Energy, Saving energy by optimising the heating system and replacing the pump, https://www.bmwi.de/Redaktion/EN/Dossier/enhancing-energy-efficiency-in-buildings.html

110 Federal Ministry for Economic Affairs and Energy, Enhancing energy efficiency in buildings, https://www.bmwi.de/Redaktion/EN/Dossier/enhancing-energy-efficiency-in-buildings.html

111 Federal Ministry for Economic Affairs and Energy .Neue Forschungsinitiative stärkt Energiewende in Gebäuden und Städten, April 2016. https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2016/20160411-neue-forschungsinitiative-staerkt-energiewende-in-gebaeuden-und-staedten.html

112 National Energy Efficiency Action Plan (NEEAP) 2017 for the Federal Republic of Germany, March 2017. https://ec.europa.eu/energy/sites/ener/files/documents/de_neeap_2017_en.pdf

113 Deutsche Welle, Die Sorgen waren umsonst. May 2014. http://www.dw.com/de/die-sorgen-waren-umsonst/a-17591643

114 European Commission, Single Market Scoreboard – Germany. http://ec.europa.eu/internal_market/scoreboard/performance_by_member_state/germany/index_en.htm#maincontentSec8

115 European Commission, European Court of Justice rules favourably for the Commission over the German barriers to trade in construction products. October 2014. http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=7860&lang=en

116 Deutsches Institut für Bautechnik (DIBt), CJEU judgment C-100/13, October 2016. https://www.dibt.de/en/DIBt/DIBt-EuGH-Judgement.html

117 WBP International, EPLF statement on the ECJ decision regarding German requirements for construction products. October 2014. http://www.wbpionline.com/news/eplf-statement-on-the-ecj-decision-regarding-german-requirements-for-construction-products-4418524/

118 European Court of Justice overturns additional requirements for the marketing of construction products in German Building Rules List. January 2015. http://www.klconstructionlawblog.com/2015/01/articles/articles-and-publications/european-court-of-justice-overturns-additional-requirements-for-the-marketing-of-construction-products-in-german-building-rules-list/

119 Zentralverband Deutsches Baugewerbe, Baugewerbe warnt: Der 15. Oktober: ein schwarzer Tag für die deutsche Bauwirtschaft: Alleinige CE-Kennzeichnung von Bauprodukten führt zu Unsicherheit für Planer, Bauunternehmen und Bauherren, October 2016. http://www.presseportal.de/pm/33001/3456022

120 European Commission, Joint Research Center, State of implementation of the Eurocodes in the European Union, 2015. http://eurocodes.jrc.ec.europa.eu/show_Entity.php?file_id=EC_00000114

121 World Economic Forum, The Global Competitiveness Report 2016–2017. http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

122 World Economic Forum, The Global Competitiveness Report 2016–2017. http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

123 Federal Ministry for Economic Affairs and Energy, Neue Impulse für den internationalen Wettbewerb um strategische Großprojekte – Chancen für Deutschland verbessern", October 2016. https://www.bmwi.de/Redaktion/DE/Downloads/E/eckpunktepapier-exportstrategie.html

124 Deloitte, European powers of construction 2016, June 2017. https://www2.deloitte.com/be/en/pages/real-estate/articles/european-powers-of-construction-2016.html

125 European Commission, Businesses are discouraged from participating in foreign public tenders. http://ec.europa.eu/internal_market/20years/singlemarket20/challenges/display/challenge-16_en.htm

126 European International Contractors (EIC), Volume of turnover 2016. http://www.eic-federation.eu/media/uploads/newsitem/2016_statistics_turnover_short.pdf

127 Deutsche Bauindustrie, Auftragseingang aus dem Ausland. http://www.bauindustrie.de/zahlen-fakten/statistik-anschaulich/international/auftragseingang-aus-dem-ausland/

128 Deutsche Bauindustrie, Das internationale Baugeschäft, http://www.bauindustrie.de/themen/internationales-bauen/das-internationale-baugeschaft/

129 Deutsche Bauindustrie, Mittel- und Osteuropa Portal, http://www.bauindustrie.de/themen/internationales-bauen/mittel-und-osteuropa-portal/

130 OECD, Germany - Economic forecast summary, November 2017. http://www.oecd.org/eco/outlook/economic-forecast-summary-germany-oecd-economic-outlook.pdf

131 OECD, Germany - Economic forecast summary, November 2017. http://www.oecd.org/eco/outlook/economic-forecast-summary-germany-oecd-economic-outlook.pdf

132 Zentralverband des Deutschen Baugewerbes, Große Zuversicht für 2017: Umsatzwachstum von 5 % erwartet, January 2017, http://www.zdb.de/zdb-cms.nsf/id/grosse-zuversicht-fuer-2017-umsatzwachstum-von-5-erwartet-de?open&ccm=040

133 Zentralverband des Deutschen Baugewerbes, Baukonjunktur 2016 – Ausblick 2017, November 2016. http://www.zdb.de/zdb-cms.nsf/res/060-2016%20Baukonjunktur%202016.pdf/$file/060-2016%20Baukonjunktur%202016.pdfHandelsblatt, Bundestag präzisiert EU-Vorgabe, March 2017. http://www.handelsblatt.com/finanzen/immobilien/

134 wohnimmobilienkreditrichtlinie-bundestag-praezisiert-eu-vorgabe-/19592782.html

135 Ibidem.

136 Ibidem.

137 Zentralverband des Deutschen Baugewerbes, Baumarkt 2018 weiter auf stabilem Wachstumskurs, January 2018 https://www.zdb.de/zdb-cms.nsf/id/baumarkt-2018-weiter-auf-stabilem-wachstumskurs-de?open&ccm=040010